REPORT RESUMES

THE PREPARATION OF CURRICULUM MATERIALS AND THE DEVELOPMENT OF TEACHERS FOR AN EXPERIMENTAL APPLICATION OF THE CLUSTER CONCEPT OF VOCATIONAL EDUCATION AT THE SECONDARY SCHOOL LEVEL. VOLUME—IV, INSTRUCTIONAL PLANS FOR THE ELECTRO-MECHANICAL CLUSTER.

BY- MALEY, DONALD MARYLAND UNIV., COLLEGE PARK REPORT NUMBER BR-6-2312 PUB DATE AUG 67 GRANT OEG-2-7-D62312-D175 EDRS PRICE MF-\$D.5D HC-\$5.08 125P.

DESCRIPTORS- *OCCUPATIONAL CLUSTERS, *ELECTRICAL OCCUPATIONS, *TEACHING GULDES, *CURRICULUM GUIDES, *TRADE AND INDUSTRIAL EDUCATION, GRADE 11, GRADE 12,

DESIGNED FOR USE WITH 11TH AND 12TH GRADE STUDENTS, THIS CURRICULUM GUIDE FOR THE OCCUPATIONAL CLUSTER IN ELECTRO-MECHANICAL INSTALLATION AND REPAIR WAS DEVELOPED BY PARTICIPATING TEACHERS FROM RESULTS OF THE RESEARCH PROCEDURES DESCRIBED IN VOLUME I (VT 004 162). THE COURSE DESCRIPTIONS, NEED FOR THE COURSE, COURSE OBJECTIVES. PROCEDURES, AND INSTRUCTIONAL PLAN ARE DISCUSSED BRIEFLY. THE TASKS AND HUMAN REQUIREMENTS ARE ARRANGED IN AN INSTRUCTIONAL SEQUENCE FOR EACH OCCUPATION INCLUDED IN THE ELECTRO-MECHANICAL INSTALLATIONS AND REPAIR CLUSTER--AIR CONDITIONING AND REFRIGERATION SERVICING, BUSINESS MACHINE SERVICING, HOME APPLIANCE SERVICING, AND RADIO AND TELEVISION SERVICING. SUGGESTED TEACHING METHODS, INSTRUCTIONAL MATERIALS, STUDENT ACTIVITIES, AND EVALUATION PROCEDURES ARE ARRANGED IN COLUMNS OPPOSITE EACH AREA OF HUMAN REQUIREMENT. AN INSTRUCTIONAL MATERIALS LIST CONTAINS BOOKS, MANUALS, PAMPHLETS, FILMS, FILMSTRIPS, AND CHARTS. VOLUME II. INSTRUCTIONAL PLANS FOR THE CONSTRUCTION CLUSTER (VT 004 163) AND VOLUME III. INSTRUCTIONAL PLANS FOR THE METAL FORMING AND FABRICATION CLUSTER (VT 004 164) COVER THE OTHER TWO OCCUPATIONAL CLUSTERS THAT WERE DEVELOPED BY THE PROJECT. (MM)

FINAL REPORT
(One of Four Volumes)
Project No. 6-2312
Grant No. OEG 2-7-062312-0175

THE PREPARATION OF CURRICULUM MATERIALS AND THE DEVELOPMENT OF TEACHERS FOR AN EXPERIMENTAL APPLICATION OF THE CLUSTER CONCEPT OF VOCATIONAL EDUCATION AT THE SECONDARY SCHOOL LEVEL

· 🚵

Volume IV

Instructional Plans for the Electro-Mechanical Installation and Repair Cluster

August 1967

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Office of Education
Bureau of Research

VIEW 4165

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE OFFICE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

THE PREPARATION OF CURRICULUM MATERIALS AND THE DEVELOPMENT OF TEACHERS FOR AN EXPERIMENTAL APPLICATION OF THE CLUSTER CONCEPT OF VOCATIONAL EDUCATION AT THE SECONDARY SCHOOL LEVEL

Volume IV

Instructional Plans for the Electro-Mechanical Installation and Repair Cluster

Contract Number OEG 2-7-062312-0175

Dr. Donald Maley

August . 1967

The research reported herein was performed pursuant to a grant with the Office of Education, U.S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

Industrial Education Department
University of Maryland
College Park, Maryland



TABLE OF CONTENTS

| | Page |
|---|------|
| INTRODUCTION | 111 |
| INSTRUCTIONAL PLANS | • |
| A. Air Conditioning and Refrigeration Servicing | 1 |
| B. Business Machine Servicing | 21 |
| C. Home Appliance Servicing | 38 |
| D. Radio and Television Servicing | 84 |
| INSTRUCTIONAL MATERIALS LIST | 112 |



INTRODUCTION

The volume for the occupational cluster of electro-mechanical installation and repair is the result of the research procedures which are described in Part IV of the final report volume. The insturctional plans for the ciuster were developed by the teachers participating in the program. Each teacher selected one of the occupations in the cluster and developed an instructional plan based on the tasks and areas of human requirement identified during the first phase of the project. The areas of human requirement are arranged in a suggested instructional sequence for each task in the occupation. The teaching methods, instructional materials, student acitivties, and methods of evaluation were then identified for each area of human requirement.

COURSE DESCRIPTION: The instructional plan for the occupation cluster of electro-mechanical installation and repair is designed to be used in a cluster concept program in vocational education at the secondary school level. The program is aimed at the development of skills and understandings related to a group of occupations within the electro-mechanical installation and repair cluster. It is not an in-depth development into any one occupation, but aims at preparing students to enter a number of occupations within the electro-mechanical installation and repair cluster.

NEED FOR THE COURSE: The course is designed to meet the needs of students pursuing a general curriculum in the secondary school system by providing job entry skills in a number of related occupations. It is also designed to meet the student's need for self appraisal of interests and potentialities in a number of occupations.



Specific needs include the following:

- 1. To provide students with the opportunity for a greater degree of mobility on a geographical basis.
- 2. To provide students with the opportunity for mobility within an industry or occupation.
- 3. To provide students with the opportunity for greater flexibility in occupational choice patterns.

COURSE OBJECTIVES: The course for the electro-mechanical installation and repair cluster will be directed toward the following objectives:

- I. To broaden the student's knowledge of the available opportunities in occupations found in the electro-mechanical installation and repair cluster.
- 2. To develop job entry skills and knowledge for several occupations found in the electro-mechanical installation and repair cluster.
- 3. To develop a favorable attitude toward work in the electro-mechanical installation and repair cluster.
- 4. To develop a student's insight into the sources of information that will be helpful to him as he moves through the occupational areas.

The specific objectives for the course are the following:

- 1. To develop the student's competency in the use of common hand tools found in the electro-mechanical installation and repair cluster.
- 2. To develop the student's competency in using power tools and equipment needed for job entry into the occupations found in the electro-mechanical installation and repair cluster.
- 3. To develop the student's understanding of the operations, procedures, and processes associated with the electromechanical installation and repair cluster.
- 4. To develop safe working habits related to the occupations within the electro-mechanical installation and repair cluster.



- 5. To familiarize the student with the terminology associated with the electro-mechanical installation and repair cluster.
- 6. To develop an understanding of the resources available to him in his pursuit of the course as well as in his work following graduation.

PROCEDURE: It is recommended that the course be offered during the student's junior and senior year in high school. Instruction should be provided for two periods a day, five days a week, during the school year.

The most appropriate facility would be a self-contained laboratory unit containing the essential tools and equipment necessary for teaching job entry tasks in the electro-mechanical installation and repair cluster.

The instructor should be a person with some experience and competence in the occupations included in the cluster. The course should be organized by the teacher on a multiple activity basis with groups of students rotating through the specific occupational areas. The common areas of human requirement needed to perform the tasks in the cluster should be emphasized so that an opportunity is provided for the students to transfer the common skill or knowledge from one occupation to another.

The possibility of team teaching procedures would be appropriate for the electro-mechanical installation and repair cluster. Specialists in different occupational areas would participate in the instructional program. The team teachers could be other vocational teachers as well as competent individuals from the community.

The instructor of the course should coordinate his program with other teachers in the school to develop the competencies in mathematics, science, and communication that will be needed for successful performance



in the occupations found in the electro-mechanical installation and repair cluster. Community resources, such as local industries, employment agencies, and tradesmen should be utilized to provide occupational information and knowledge needed concerning the performance of the tasks in the electro-mechanical installation and repair occupations.

INSTRUCTIONAL PLANS: The following section of the volume presents the instructional plan for the electro-mechanical installation and repair cluster. The tasks and areas of human requirement are arranged in an instructional sequence for each occupation. Suggested teaching methods, instructional materials, student activities, and evaluation procedures are found opposite each area of human requirement. Instructional plans for occupational information are found at the end of each occupation. The plan sheets in the volume provide teachers with the information needed to implement an electro-mechanical installation and repair cluster concept program at the secondary school level.

AIR CONDITIONING AND REFRIGERATION SERVICING



TASK NO. 1: INSTALLING TUBING BETWEEN CASE AND CONDENSING UNIT

| APEA OF HU'AN PECLIPEYE, T | SUBBESTED TEACHING WETHODS | SUSCESTED INSTRUCTIONAL WATERIALS | SUGGESTEC STLCENT ACTIVITIES | SUGGESTED EVALUATION PROCEDURES |
|---|--|---|--|--|
| Interpreting drawings, specifications, manufacturer's catalogues, service manuals, schematics and handbooks for: (a) Installation procedures and techniques (b) Service procedures. (c) Type, function and rating of defective part. (d) Electrical supplies. (e) Repair ar.: replacement of components. (g) Electrical codes. | Demonstration. Lecture. Practical work. Self studo. Programm.: ins ruction Film. | Drawings, specifications, catalogues, manuals, schematics, handbooks, textbooks and code. Assortment of components, i.e., tubing. Special too! kit (service). Common hard tools and measuring devices. Film: "Making and Repairing Tubing Connections," 16 min., sd., b & w., Order No. 0E452, buy from Un. ed World Films, inc., 1445 Park Ave., New York 29, N.Y. | A. Listening to explanation. B. Reading drawings, specifications, catalogues, manuals, schematics, and handbooks. C. Identifying components from drawings. D. Listing and defining new terms. E. identifying special tools. F. Writing specifications for defective parts. G. Listening to film. | A. Written or oral quiz. B. Writter quiz. C. Observation by teacher. D. Observe and demand the use of new terms. E. Oral explanation of name and purpose of special tools. F. Order a replacement part from manufacturer's catalogue. G. Written test on film. |
| Interpreting instructions and information located on the data plate of the unit. | Explanation. Lecture. | Date plates. | Reading data plate and following instructions. | Geck sheet as to accuracy of interpretation. |
| Measuring the inside diameter and outside diameter of tubing with callosts and rule. Measuring the length of tubing with steel tape to accuracy of 1/16 of an inch. Accing numbers and fractions to determine total length of tubing. | Demonstration. Practical work. | Tubing of assorted length. Dismeter. Calipers - 10, 20. Steel tape. | Mesuring each sample item to determine length, i.D., O.D. | Check sheet against known values. |
| Cutting tubing to specific length with tubing cutter. | Demonstration. Practical work. | Assorted tubing. Tubing cutter. Ruie. Steel tape. Textbook: Refrigeration and Air Conditioning by Althouse | Outting tubing with tubing cutter. | Check accuracy of cut according to specified length. |
| Explaining how to make allowances by bonds. Bending tubing with a machine and spring to fit the unit. | Demonstration. Practical work. | Tubing. Bonding machine. Bending spring. | Bonding tubing with a machine and spring to fit the unit. | Check the bend against the specifications. |
| Reaming tubing to remove inside burr with hand reamer. Selecting the proper type and size of reamer for the job to be done. | Demonstration. P. actical work. | Tubing. Hand reamer. | Reaming tubing with hand reamer. | Inspect the tubing with hurr removal. |
| Flaring tubing with flaring tcol to insure proper seal. | Explanation. Practical work. | Flaring tool. Tubing. | Flaring tubing with a flaring tool. | Test for t oper seal or operating urit. |

| * | ERIC THIS REPORT OF THE PROPERTY OF THE PROPER | |
|----------|--|--|

| Solder: soft. soft. fubing. fubing. Tubing. Solder Wiping. Solder Wiping. Solder Wiping. Solder Wiping. Zo min., sd., b & w., both films, buth from United World Films, inc., 1445 Park Ave., New York 29, N.Y. Copper tubing. Corrosive acid. Ammonia. Sulphur dioxide. | Solder: Safety cleaning and soldering -copper tubing. T | Solver: Soft property of the control of the contro | Solder: 1 10 10 10 10 10 10 10 | Demonstration. Practical work. Films. |
|---|--|--|--|---------------------------------------|
| Copper tubing. Corrosive acid. Amonia. Sulphur dioxide. | Copper tubing. Observing demonstration. Amonia. Sulphur dioxide. | Corrosiva acid. Amonia acid. Sulphur dloxide. | Copper tubing. Corrosive sold. Amonia. Sulphur dioxide. | ŧ |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

TASY 2: TESTING LINES WITH DETECTION DEVICE FOR LEAKS

| SLGGESTED EVALUATION PROCEDURES | A. Written or oral quiz. B. Writter quiz. C. Observation by teacher. C. Observe and demand the use of new terms. E. Oral explaination of name and purpose of special tools. | | Quiz on film and text. | Written quiz to determine students ability to recognize different refrigerants by sight, smell, or feel (use sample of each). | Observation for sate practices by students. | Quiz on safety precautions. Observation as to practice. | Check for correct refrigerant for the unit according to the data plate. |
|--------------------------------------|---|---|---|---|--|--|---|
| SUGGESTED STUDENT ACTIVITIES | A. Listening to explanation. B. Reading drawings, specifications, catalogues, manuals, schematics and handbooks. C. Identifying components from drawings. D. Listing and defining new ferms. E. Identifying special tools. F. Writing specifications for defective parts. G. Listening to film. | | Listening to film. Watching demonstration. Reading text on refrigerants. | Comparing the characteristics of the different refrigerants. | Observing demonstration. | Observing safety regulations when handling refrigerants. | Reading data plate on the unit. Making selection from stock. |
| SUGGESTED INSTRUCTIONAL MATERIALS | Drawings, specifications, catalogues, manuals, schematics, handbooks, text books and code. Assortment of components, i.e., tubing. Special tool kit (service) Common hand tools and measuring devices. Film: "Waking & Repairing Tubing Connections," 18 min, 5d, b & w, Under No. OE452, buy from United World Films, Inc., 1445 Park Ave., | Data plates. | Amonia. Water. Freon - 12. Sulphur dioxide. Sulphur dioxide. Martyl chloride. Copper tubing. Aluminum tubing. Air Conditioning by Althouse and Turnquist, Chapter 11. Film: "Locating and Repairing Leaks," I7 min., 5d., b & w, United World Films, inc., 1445 Park Avenue, New York 29, N.Y., buy from United | Ammonia. Freen 12 - 22. Sulphur dloxide. Methyl chloride. | Safety equipment: gloves and apron. goggles. shoës. | Safety equipment: gloves and apron. goggles. shoes. | Refrigerants. Oata plates. |
| SUGGESTED TEACHING METHODS | Demonstration. Lecture. Practical work. Film. Self study. | Explanation. Lecture. | Demonstration. Lecture. Film. | Demonstration. Lecture. | Demonstration. Lecture. | Demonstration. Practical work. | Practical work. |
| AREA OF HUMAN REQUIPEWENT | Interpreting drawings, specifications, manufacturer's catalogues, service manuals. 1. Installation procedures and techniques. 2. Service Procedures 3. Type, function and rating of defective part. 4. Electrical Supplies. 5. Repair and Replacement of Components. 6. Special Service Tools. 7. Electrical Codes. | Interpre'ing instructions from data plate of the unit. | Explaining the chemistry of refrigerants and their reaction in contact with other materials. | Recognizing the different types of refrigerants. | Demonstrating proper safety precautions when testing for refrigerant leaks in enclosed spaces. | Practicing satety procedures when handling refrigerants. | Selecting the proper type of refrigerant according to specifications. |

Observe use of halide leak detector. Observe use of an electronic leak detector. Performance test by student. SUGGESTED EVALUATION PROCEDURES Observe correct flame form. Reading assigned text and reference material. Testing a unit for leaks with a halide leak detector. Testing for leaks in a unit with an electronic leak detector. Testing for refrigerant leaks with: Regulating the pressure on a halide leak detector. SUGGESTED STUDENT ACTIVITIES (a) soap.(b) litmus paper.(c) sulphur stick. Textbook: Modern Refrigeration and Air Conditioning by Aithouse and Turnquist, p. 28.
Residential and Commercial Air Conditioning by Burkhardt, pp. 252-4. Halide Leak detector.

Air conditioning unit.

Taxbook: Modern Refrigeration and Air Conditioning by Airbouse and Turnquist, p. 282; p. 479. Electronic leak detector.
Refrigerator unit.
Textbook: Modern Refrigeration and
Air Conditioning by Althouse and
Turnquist, p. 203; p. 479. SUGGESTED INSTRUCTIONAL MATERIALS Halide leak detector. SUGGESTED
TEACHING METHODS Demonstration. Lecture. Practical work. Demonstration. Lecture. Practical work. Demonstration. Lecture. Practical work. Practical work. Applying the proper procedures when using an electronic leak detector. proper procedures when refrigerant leaks when Regulating the pressure on a halide leak detector. Applying the proper procedures when using the halide leak detector. AREA OF HUMAN REQUIREMENT (a) Soap test. (b) Litmus paper. (c) Sulphur stick. Applying the checking for using: Task 2 (continued

5

TASK NO. 3 Instaling Gages on Condenser to Charge the Unit With Refrigerant

| SUGSESTED EVALUATION PROCEDUPES | Written or oral quiz. Written quiz. Observation by teacher. Observe and demand the use of new terms. Oral explanation of name and purpose of special tools. Order a replacement part from manufacturer's catalogue. Written test on film. | as to accuracy of | Chec. list of known values against comuted values. | Written evaluation shaet. | Visual check for proper connection. | Test students ability to recogn ze different types of gages. | Written examination. | Written examination. | Writter examination on text moterial. |
|--------------------------------------|--|--|--|---|--|---|--|--|--|
| ΕV | A. Written or oral q B. Written quiz. C. Observation by te D. Observe and deman terms. E. Oral explanation of special tools. F. Order a replaceme manufacturer's ca G. Written test on f | Check sheef as Interpreta ion | Chec. 11st of kn com:uted values. | Written eva | Visual che | Test studen different t | Written ex | Written ex | Writter ex |
| SUGGESTED STUDENT ACTIVITIES | A. Listening to explanation. B. Reading drawings, specs, catalogues, manuals, schematics and handbooks. C. Identifying components from drawings. D. Listing and defining new terms. E. Identifying special tools. F. Writing specifications for defective parts. G. Listening to film. | Reading data plate and following instructions. | Reading gages and making comparisons on chart of known values. | Working with conversion tables and formulas. | installing the service gage manifold on the unit. | Examining gages of various types to determine the difference. | Examination of manometers by students. | Working with wet wick wacuum indicators. | Following lecture in text. Reading reference material. |
| SUGGESTED INSTRUCTIONAL MATERIALS | Drawings, specifications, catalogues, manuals, schematics, handbooks, textbooks and code. Assortment of components, i.e., tubing. Special tool kit (service). Common hand tools and measuring devices. Film: "Making and Repairing Tubing Connections," Is Min sd., b. & w., Order No. OE 452, United World Films, Inc., 1445 Park Ave., New York 29, N.Y. | Data plates. | Vacuum gages. Textbook: Modern Refrigeration and Air Condiffioning by Aifhouse and Turnquist, pp. 260-267. | Student work sheet. Textbook: Modern Refrigeration Air Conditioning by Althouse and Turnquist, pp. 15-30. | Service gage manifold. Refrigerator unit. | Various gages. | Various manometers. | Wet wick vacuum indicators. | Textbook: Modern Refrigeration and Air Conditioning, by Althouse and Turnquist, pp. 47-49. |
| SUCCESTED TEACHING METHOUS | Demonstration. Lecture. Practical work. Self study. Programmed instruction. Film. | Explanation Lecture. | Demonstration. Lecture. Practical work. | Practical work. | Demonstration. Practical work. | Demonstration. Practical work. | Demonstration. Practical work. | Demonstration. Practical work. | Demonstration. Lecture. |
| AREA OF HUMAN REQUIRE**E*;T | Interpreting drawings, specifications, manufacturer's catalogues, service manuals, schematics and handbooks for. (a) Installation procedures & techniques. (b) Service procedures. (c) Type, function and rating of defective part. (d) Electrical supplies. e) Repair and replacement of components (′) Special service tools. (g) Electrical codes. | interpreting instructions and information located on the data plate of the unit. | interpreting gages to determine the depth and duration of vacuum as indicated in specifications. | Converting gage pressure to absolute, inches or millimeters of mercury. | Demonstrating the proper procedures when connecting a service gage manifold when charging refrigerator system. | Recognizing the various types of gages. | Recognizing types and use of manometers. | Recognizing types and use of wet wick vacuum indicators. | Recognizing necessary care when using vacuum indicators. |

| EDIC |
|----------------------------|
| Full Text Provided by ERIC |

| AREA OF HUMAN REQUIREMENT | SUGGESTED TEACHING METHODS | SUGGESTED INSTPUCTIONAL MATERIALS | STUDENT ACTIVITIES | SUGGESTED EVALUATION PPOCEDURES |
|--|----------------------------------|--|----------------------|--|
| Recognizing the resuits of excessive pressures in the rastigerator system. | Lecture. Student work shaets. | Work sheets. | Group discussion. | Written quiz. |
| Applying the proper care, maintenance and storage of instruments. | Demonstration. | Complete set of all alr conditioning tools and equipment. | Watch demonstration. | Observation of proper handling of instruments by students. |
| | | | · | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | ٠ | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | , | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

TASK 4: EVACUATING ENTRIE SYSTEM WITH VACUUM PUMP TO REMOVE ALL NON-CONDENSABLES

| | | | 1 | |
|--|---|--|---|---|
| AREA OF HUMAN REQUIRE"ENT | SUGGESTED TEACHING METHODS | SUGGESTED INSTPUCTIONAL MATERIALS | STUDENT ACTIVITIES | SUGGESTED EVALUATION PROCEDUPES |
| Explaining the process using a vacuum pump connected to refrigerant compressor to draw a vacuum in the system. | Demonstration. Lecture. | Textbook: Modern Refrigeration and Air Conditioning by Althouse and Turnquist, pp. 278–280. | Following demonstration. Read text. | Written quiz. |
| Demonstrating the procedure of using vacuum pumps to evacuate the system. | Demonstration. | Vacuum pump. Refrigeration unit. | Following demonstration. Evacuate a system. | Test students ability to evacuate a system using a vacuum pump. |
| Explaining the efforts of moisture in the system. | Lecture or job sheet. | Textbook: Wodern Refrigeration and Air Conditioning by Aithouse and Turnquist, pp. 278-280. | Following lecture, read text. Working from job sheet. | Written quiz. |
| Explaining the effects of non-condensable gasses in the system. | Lecture or job sheet. | Textbook: Wodern Refrigeration and Air Conditioning by Althouse and Turnquist, pp. 278-280. | Following lecture in text. Working from job sheet. | Written quiz. |
| Explaining the process of changing a liquid to a gas. | Demonstration. Lecture. Filmstrip. | Hot plate and water. Filmstrip: "Basic Principles of Refrigeration,"71 ft., b & w, with record, #F.21-a, borrow from U.S. Public Health Service Communicable Disease Cfr., Atlanta 22, Ga. | Evaporating water. Listening to filmstrip. Foliowing lecture. | Qulz on demonstration and filmstrip. |
| Reading instruments (gages) to determine desired vacuum. | Practical work. Job sheet. | Gages. Refrigerator unit. Vacuum pump. | Reading instruments and determining vacuum. | Check answers on job sheet. |
| Interpreting gages to determine the depth and duration of vacuum as indicated in specifications. | Demonstration. Lecture. Practical work. | Vacuum gages. Textbook: Modern Refrigeration and Air Conditioning by Althouse and Turnquist, pp. 15-30. | Working with conversion tables and formulas | Written evaluation sheet |
| Measuring refrigerant in system with a pressure gage. | Demonstration. Practical work. | System unit. Pressure gage. | Measuring refrigerant with gages. | Observe students. |
| Converting inches of vacuum to percent of air. | Informational sheet. Job sheet. | Informational sheet. Job sheet. | Making mathematical calculations to connect inches of vacuum to percentage air. | Answer sheet. |
| | | | | |

| SUGGESTED EVALUATION PROCEDUPES | Operational check. | Written quiz. | Operational check of equipment |
|-----------------------------------|--|---|--|
| SUGGESTED STUDENT ACTIVITIES | Maintaining vacuum pumps. | Working from information sheet. Following the lecture. | Maintaining vacuum indicators. Op |
| SUGGESTED INSTRUCTIONAL MATERIALS | informational sheet. Textbook: Modern Refrigeration and Air Conditions by Althouse and Turnquist, pp. 396-399. | Informational sheet. | Vacuum indicators. |
| SUGGESTED TEACHING METHODS | informational sheet. | informational sheet. Lecture. | Demonstration. Practical work. |
| AREA OF HUMAN REQUIREMENT | Caring for various types of vacuum pumps. Applying the proper care, maintenance, and storage. | Explaining the effects of mercury in the system. | Applying the proper care, maintenance of storage of vacuum indicators. |

TASK 5: REMOVING COVER FROM THE UNIT FOR EASE OF SERVICING

| SUGGESTED EVALUATION PROCEDURES | A. Written or oral quiz B. Written quiz C. Observation by teacher D. Observe and demand the use of new terms E. Oral explanation of name and purpose of special tools F. Order a replacement part from manufacturer's catalogue G. Written test on film | Correct usage of tools (observation). | inspection of care, maintenance, storage and toois. | Observation of student at work. | Demonstration by student on holding work. | Observation of student. |
|--------------------------------------|--|--|---|--|--|---|
| SUGGESTED STUDENT ACTIVITIES | A. Listening to explanation B. Reading drawings, specs, catalogues, manuals, schematics and handbooks C. Identifying components from drawings D. Listing and defining new terms E. Identifying special tools F. Writing specifications for defective arts G. Listening to film | Examining different types of screwdrivers: Pilers Wrenches Nutdrivers Properly applying the tools for the purpose for which they were intended. | Maintaining toois in a working condition. | Holding, handling and using tools correctly. | Securing work for safe operations. | Twisting, pulling, and pressing with pliers. |
| SUGGESTED INSTRUCTIONAL MATERIALS | Drawings, specifications, catalogues, manuals, schematics, handbooks, textbook and code. Assortment of components, 1.e., tubing. Special tool kit (service). Common hand tools and measuring devices. Film: "Making and Repairing time: "Making and Repairing Connections," is all min, sd., t. w., Order No. OE 452, buy from thited World Films, inc., 1445 Park Ave., New York 29, N.Y. | A. Screwdrivers: phillips. read-prince. straight. e.ectricians. B. Pilers. sip joint. needle nose. diagonal. side-cutter. C. Wrenches: open end. box end. socket. D. Nutdrivers. | Tools - entire set. | Assorted hand tools: screwdrivers. pilers. wrenches. nutdrivers. | िटाding devices: clamps. vices. | Pilers. |
| SUGGESTED TEACHING METHODS | Demonstration. Lecture. Practical work. Self study. Programmed instructions. Film. | Demonstration. Practical work. | Demonstration. Practical work. | Demonstration. Practical work. | Demonstratio Practical work. | Demonstration. |
| AREA OF HIMAN REQUIREMENT | Interpreting drawings, specifications, manufacturer's catalogues, service manuals, schematics and nandbooks for: (a) Installation procedures and techniques. (b) Service procedures. (c) Type, function and rating of defective part. (d) Electrical supplies. (e) Repair and replacement of components. (f) Special service tools. (g) Electrical codes. | Selecting the proper type and size of: (a) Screwd:lvers. (b) Pilers. (c) Wrenches (d) Nutdrivers. | Applying the proper care, maintenance and storage of tools. | Recognizing the proper methods of holding wrenchas. | Applying the proper methods of holding the work. | Applying methods of holding pilers for pulling, pressing, and twisting. |

sk 5 (continued)

| APEA OF HUMAN REÇU!REMENT | SUGGESTED TEACHING METHODS | SUGGESTED INSTRUCTIONAL MATERIALS | SUGGESTED STUDENT ACTIVITIES | SUGGESTED EVALUATION PROCEDURES |
|---|-----------------------------------|--|---|--|
| Recognizing the results of using pliers for removing nuts and bolts. | Damonstration. | Pilers. Nuts. Bolts. Textbook: Modern Refrigeration and Air Conditioning by Althouse and Turnquist,p. 56 (2-39). | Student removing nuts and boits with pliers. | Student write his observation of this practice. |
| Recogn, zing the various types of fastening devices. | Demonstration. Display. | Assortment of fastening devices. | Handiing and using fartening devices. | Student can Identify and use different types of fastening devices. |
| Recognizing the various types, uses and characteristics of threaded fasteners. | Demonstration. Display. | Assortment of threaded fasteners. | Working with threaded fasteners. | Student will correctly use threaded fasteners. |
| Recognizing the various types and uses of washers. | Demonstration. Display. | Assortment of washers. | Students determining the correct usage of washers. | Proper application of washers. |
| Applying the proper method of removing threaded fasteners. | Demonstration. Practical work. | Tools: Wrenches- Nurdelvers. Refrigeration units. | Removing threaded fasteners to disassemble the unit. | Observe the correct usage of icols. Threaded fasteners not damaged. |
| Recognizing the difference between right and left hand threads. | Demonstration. Practical work. | Examples of: Right hand threads, boit and nut. Left hand threads, boit and nut. Thread charts. | Examining left hand and right hand boits and muts. Working with left hand and right hand threads. | Student will be able to recognize the different types of threads. |

TASK 6: - EPLA NG THE DEFECTIVE COMPONENT (S) IN THE REFRIGERATION UNIT

| · · · · · · · · · · · · · · · · · · · | | | | | | manufacture and an extension |
|---------------------------------------|---|---|--------------------------------------|--|---|--|
| SUCCESTED E'ALUATICM PROCEDURES | A. written or oral quiz B. written quiz C. Observation by teacher D. Observe and demand the use of new terms E. Oral explanation of name and purpose of special tools F. Order a replacement part from manufacturer's catalogue G. Written rest on film. | Check Sheet against known values. | Observe Students. | Test connections for leaks under 150 psi compressed air. | Test connections for leaks under 150 psi compressed air. | Observe students making solder joints. Observe students un-soldering joints. |
| SUGGESTED STUDENT ACTIVITIES | A. Listening to explanation B. Reading drawings, specs, catalogues, manuals, schematics and handbooks C. identifying components from dravings D. Listing and defining new terms E. identifying special tools F. Writing specifications for defective parts G. Listening to film. | Measuring each sample item to defermine length, 1.D. and 0.D. | Messurins Refrigerant With Gauges. | Making solderless connections in non- farrous metal tubing. | Making soldered connections in copper tubing. | Making solder joints in tubing. Unsoldering joints with a torch. |
| SUSSESTEC INSTRUCTIONAL MATERIALS | Crawings, specifications, catalogues, manuals, schematics, handbooks, textbooks and code. Assortment of components, i.e., tubing. Sparal tool kit (service). Corporate hand tools and massuring devices. Film: "Making and Repairing Tubing Connections," if Maring and Repairing Tubing Connections," if the min, sd., b & w., order No. 452, buy from United World Films, inc., i445 Park Ave., New York 29, N.Y. | Tubing of assorted length: Diameter. Calipers - 10, 00. Civil tape. Could be to the terminal tape. | System unit. Pressure gage. | Tubing: Croper Aluminum Flare convectors. | Solder: Soft Silver, 1,2,3 Torch Flux Copper tubing | Torch. Solder Soft Siver Flux Brush Tubing |
| SUGCESTED TEACHING "ETHODS | Demonstration. Lecture. Self study. Programmed inst uction. Film. | Demonstration. Lecture. Practical work. | Demonstration. Practical work. | Demonstration. Lecture. Practical work. | Lecture. Display. | Demonstration. Practical work. |
| AREA OF HUMAN REOUIDEMENT | Interpreting drawings, specifications, manufacturer's catalogues, service manuals, schematics and handbooks for: (a) Installation procedures & techniques (b) Service procedures (c) Type, function & rating of defective part (d) Electrical supplies (e) Repair and replacement of components (f) Special service tools (g) Electrical codes. | Measuring the inside diameter and outside diameter of tubing with calipers and rule. Measuring the length or tubing with steel tape to accuracy of 1/i6 of an inch. Adding numbers and fractions to determine total length of tubing. | Measuring refrigerant in the system. | Recognizing the properties of non-ferrous metals when making soiderless connections. | Selecting the proper type of solder recommended for refrigeration sweated joints. | Demonstrating the proper techniques of using a torch for soldering and unsoldering joints. |



Task 6 (continue

| SUGGESTED EVALUATION PROCEDURES | Check accuracy of cut according to specified length | The tubing with our removed. Inspeci | inspect the tubing with burr removed | Test for proper seal on operating unit | Observe the operation of the charged unit. Test for leaks. | Correct usage of tools (obsertation) |
|--------------------------------------|--|--|---|--|---|---|
| SUGGESTED STUDENT ACTIVITIES | Outting tubing with tubing cutter | Resming tubing with hand reamer | Reming tubing with Hand Regmen | Fiaring tubing with a tiaring tool | Evacuating the system with vacuum pump. Installing gage manifold. Charging system with refrigerant. | Examining different types of screwdrivers m srenches m nutdrivers Properly applying the tools for the purpose for which they were intended |
| SUGGESTED INSTRUCTIONAL MATERIALS | Assorted tubing. Tubing cutter. Rule. Steel tape. Tartbook: Modern Refrigeration and Alr Conditioning by Althouse and Turnquist. | tubing hand reserv | Tubing. Hand reaser. | Flaring tool. | Vacuum pump. Gages. Rafrigerants. Rafrigeration unit. | Screwn ivers phililips read-prince straight electricians Pliers slip joint needle nose diagonal side cuffer Wrenches open end box end socket Nutdrivers |
| SUGGESTED TEACHING METHODS | Demonstration. Practical work. | Demonstration Fractical work | Demonstration. Practical work. | Explanation. Practical work. | Demons tration. Practical exercise. | Descritation. Practical work. |
| AREA OF HJMAN REQUIREMENT | Cutting tubing to specific lengths with tube cutter. Applying proper care, maintenance, and storage of tube cutters. | Selecting the proper type and size of reamer for the job to be done. | Removing tubing to remove inside burr with hand reamer. | Flaring tubing with flaring tool to Insure proper seal. | Charging the refrigeration system with the specified refrigerant. | Selecting the proper type and size of: (a) screwdrivers (b) pilers (c) wranches (d) cuffers (e) levels (nutdrivers) |



Task 6 (continued)

| AREA OF IAJMAN REQUIREMENT | SUGGESTED TEACHING METHODS | SUGGESTED INSTRUCTIONAL MATERIALS | SUGGESTED STUDENT ACTIVITIES | SUGGESTED EVALUATION PROCEDUPES |
|--|-----------------------------------|---|--|--|
| Replacing the defective components with the appropriate tools. | Mork. Study. | Assortment of refrigeration components. Hand tools: Screwdrivers phillips reductince straight electricians Pilers slip joint needle nose diagonal side cutter Wrenches open end box end socket Nutdrivers | Examining different types of screwdrivers pliers menches murdrivers nutdrivers Properly applying the tools for the purpose for which they were intended. | Correct usage of tools (observation). |
| Applying the proper care, maintenance and storage of tools. | Demonstration. Practical work. | | Maintaining tools in a working condition. | inspection of care, maintenance and storage of tools. |
| Recognizing the results of using pilers for removing nuts and bolts. | Demonstration. | Nuts. Boits. Taxbook: Modern Refrigeration and Air Conditioning by Alfhouse and Turnquist, p. 56 (2-39). | Holding, handling and using the tools correctly. | By observing students at work. |
| Applying methods of inciding pilers for pulling, pressing, and twisting. | Demonstration. | P. 1973. | Securing work for safe operations. | Demonstration ty student on holding work. |
| Applying methods of holding pilers for pulling, pressing and twisting. | Demonstration. Practical work. | Pilers. | Twisting, pulling and pressing with pilers. | Observation of student. |
| Recognizing the results of using pilers for removing nuts and bolts. | Demonstration. | Pilers. Nuts. Boits. Textbook: Modern Refrigers' ion and Air Conditioning by Aithous; and Turnquist, p. 56 (2-39). | Student removing nuts and boits with pliers. | Student write his observation of this practice. |
| Determining the proper methods of stripping wire. | Demonstration. Practical work. | Wire; solid stranded Knife. Wire stripper | Removing insulation from wire to make electrical connections. | inspection of connection. |
| Recognizing the various types of fastening devices. | Demonstration. Display. | Assortment of fastening devices. | Handling a d using fastening devices. | Student can identify and use different types of fastening devices. |
| | | | | |

| | ٠ <u>٠</u> | | | 2 e the |
|--|--|--|---|--|
| | Stud of will correctly use threaded tasteries | Proper application of washers | Observe installation procedures | Student will be able to recognize the different types of threads |
| | Morking with threaded fasteners | Student determining the correct using of washers | Installing threeded fasteners with the appropriate tools Watch demonstration | Examining LH and RH boits and nuts Working with LH and RH threads |
| all results for a fine | As riment of threaded tasteners. | Assortment of washers. | Mrenches. Screwdrivers. Nutdrivers. Fastening devices (threeded). | Examples of: Right hand threads Boits and nuts Left hand threads Boits and nuts Thread charts. |
| and the second s | Light Control of Contr | . emonstration. Display. | Demonstration. Lecture. Prartical work. | Dumpnifration. Practical work. |
| 4. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4 | 1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1. | soso pum spar, coolema me, to scoto en | Apple 13 the proper methods of 1757alling treated 14554eners. | recognizing the difference between right on pleat hand threads. |



TACK 7. REPLACING COVER ON UNIT TO RESTORE TO ORIGINAL CONDITION



Task 7 (continued)

| AREA OF HLMAN REQUIREMENT | SUGGESTED TEACHING METHODS | SUGGESTED INSTRUCTIONAL MATERIALS | SUGGESTED STUDENT ACTIVITIES | SUGGESTED EVALUATION PROCEDURES | |
|--|-----------------------------------|--|---|--|--|
| Recognizing the proper methods of holding wrenches. | Demonstration. Practical work. | Assortment of hand tools: screwdrivers pilers wrenches nutdrivers | Holding, handling and using tools correctly. | By observing students at work. | |
| Applying the proper methods of holding the work. | Camonstration. Practical work. | Holding devices: clamps vices | Securing work for safe operations. | Demonstration by student on holding work. | |
| Applying methods of holding pliers for pulling, pressing end twisting. | Demonstration. | Pilers. | Twisting, pulling and pressing with pilers. | Observation of student. | |
| Recognizing the results of using pilers for removing nuts and bolts. | Demonstration. | Pilers. Nurs. Boirs. Textbook: Modern Refrigeration and Air Condificaling, Althouse and Turnquist, p. 56 (2-39). | Student removing nuts and bolts with pilers. | Student write his observation of this practice. | |
| Applying the proper procedures for cuffing with diagonal cutters. | Demonstration. Practical work. | Wire: soild stranded Disponel cuffers. Textbook: Wodern Refrigeration and Air Conditioning by Aifhouse and Turnquist, chapter 2. | . Cutfing wire with diagonal cutters. | Observe cutting operations. | |
| Defermining the proper methods of stripping wire. | Demonstration. Practical work. | Wire: soiid stranded Knife. Wire stripper | Removing insulation from wire to make electrical connections. | Inspection of connection. | |
| Recognizing the various types of fastening devices. | Demonstration. Display. | Assortment of fastening devices. | Handling and using festening devices. | Student can identify and use different types of fastening devices. | |
| Recognizing the various types, uses, and characteristics of threaded fasteners. | Demonstration. Display. | Assortment of threaded fasteners. | Morking with threaded fasteners. | Student will correctly use threaded fasteners. | |
| | | | | | |

Task 7 (continued

| Recognizing the various types and uses of washers. | | | | |
|---|---|--|---|---|
| | Demonstration. Display. | Assortment of washers. | Student determining the correct usage of washers | Proper application of washers |
| Applying the proper methods of installing threaded fasteners. | Demonstration. Lecture. Practical work. | Wrenches. Screwdrivers. Nutdrivers. Fastening devices (threeded). | Student determining the correct usage of washers | Proper enplication of washers |
| Recognizing the difference between right and left hand threads. | Demonstration. Practical work. | Examples of: Right hand threads Boits and nuts Left hand threads Boits and nuts Thread charts. | Examining left hand and right hand bolts and nuts. Working with left hand and right hand threads. | Student will be able to recognize the different types of threads. |
| | | | | |
| | | | | |
| | | | | |
| | | | , | |
| | | | | |
| | | | | |

OCCUPATIONAL INFORMATION FOR AIR CONDITIONING AND REFRIGERATION SERVICING

| APEA OF HUMAN RECUISENENT | TEACHING "FTEEDS | SUGGESTED INSTPUCTIONAL MATERIALS | STUBENT ACTIVITIES | SYALLATION DOOR URFO |
|--|--|---|---|--|
| Employment outlook: 1. Local 2. National | Lecture - guest speaker from local employment security agency. Demonstration chart. | Speaker. Informational sheets. Publication: Occupational Outlook Handbook, U.S. Department of Labor, 1966-67 edition, Washington, D.C.: Government Printing Office, 1966. Builetin #1450-3, U.S. Department of Labor. Filt, charts. | Listening to speaker. Making notes on: Number employed Employment outlook Wage rates Job requirements | Discussion. Written quiz on employment security office. Employment trends (local and national); requirements (physical, mental); characteristics of work. |
| l. Local a. union (1) apprentice (2) journayman (3) masters b. non-union (1) antry wages (2) experienced 2. Natichal e. union (1) apprentice (2) journayman (3) masters b. non-urion (4) entry wages (2) experienced | Lacture. Demonstration. Guest speaker from local union. | Transparencies to dramatize differences between union and non-union wages on the local level. | Make notes on all phases of instruction. | Check the familiarity of the student with the wage scales of both unlon/non-unlon on the local and national level. |
| Types of fraining available: 1. Apprenticeship programs 2. Technical trade schools 3. On-the-job 4. Military | Lecture. Film. Speaker Local recruiter. | Contact area appliance dealers. Film: "Buck County Vocationai— Technical Center," Williamsport, Pa. Speaker. Teacher-prepared information sheets. | Listen to speaker. Match film. Mriting for information from appliance declars and trade schools. | Observation and discussion. |
| The working conditions experienced in the occupation. | Lecture - and/or guest speaker from service shop. | Publication: Occupational Outlook Handbook, U.S. Department of Labor, 1966-67 edition, Washington, D.C.: Government Printing Office, 1966. Bulletin #1450-3, Department of Labor. Local service shop. | Students will follow speaker/teacher and take notes. | Class discussion. |
| The physical and mertal characteristics needed for qualifications for employment. | Lecture - and/or guidance counseior. | Publication: Occupational Outlook Handbook, U.S. Department of Labor, 1966-67 edition, Weshington, D.C.: Bulletin #1450-3, Department of Labor. | Listen to lecture and take notes. | Orel discussion, |



OCCUPATIONAL INFORMATION UNIT FOR AIR CONDITIONING AND REFREIGERATION SERVICING (CONTINUED)

| | ė | · | ÷ |
|--|--|---|--|
| ESTET. | cussion | scussic | cussion |
| FVA LATIN, TECT | Oral discussion. | Class discussion. | Oral discussion. |
| F, A | ō | ū | ర్ |
| | | | |
| | tes. | otes. | rtes. |
| | Listen to lecture and take notes. | Listen to lecture and take notes. | Listen to lecture and take notes. |
| 1155 | Pue € Li | ₽ ₽ | Pue PL |
| THERESTEE | o lectu | 0 10 10 10 10 10 10 10 10 10 10 10 10 10 | o lectu |
| T SERT | isten t | t uets! | fsten t |
| ` | -4 | , | ٠ |
| | | | |
| | . 000 | . 8 | • |
| ្ន | Publication: Occupational Outlook Handbook, U.S. Department of Labor, 1966-67 edition, Washington, D.C.: Government Printing Office, 1966. Builetin #1450-3, Department of Labor. Transparencies. | Publication: Occupational Outlook Handbook, U.S. Department of Labor, 1966-67 edition, Washington, D.C.: Government Printing Office, 1966. Builetin #1450-3, Department of Labor. | Publication: Occupational Outlook Handbook, U.S. Department of Labor, 1966-67 edition, Washington, D.C.: Government Printing Office, 1966. Builetin #1450-3. |
| COCESTED INCTRUCTIONAL MATERIALS | tional (tment or hington Office, | tional (twent or hington Office, partman | tional of the control of fice. |
| CUCCEST | Occupa Departion Was On, Was Infing O-3, Del | Occupa on Depart on Wasi Inting 0-3, De | Occupa . Depar on, Was inting |
| COUT 241 | Publication: O Hendbook, U.S. I 1966-67 edition Government Prin Bulletin #1450- Transparencies. | ation: ok, U.S 7 edit: ment Pr in #145 | ation: ok, U.S 7 editi ment Pr in #145 |
| | Public Handbo 1966-6 Govern Bullet Transp | Public Handbo 1966-T Govern Bullet | Public Handbo 1966 L Govern |
| | | | و <mark>.</mark> |
| ر ا 1 ا | <u>.</u> | | ve and/o |
| TPACHIN METHICS | Lecture. Demonstration. | Lecture by local servicemen. | Lecture. Local union representative and/or ner-led discussion. |
| Ç#'d⊥ | Lecture. Demonstr | Lectus Servic | Lecture. Local un represen , |
| | | | |
| | | ; | |
| ۶- پي | amp l oyme | ges of 1 | 6 |
| ארושין ארייידייקיידייריין אריינין אריינין אריינין אריינין אריינין אריינין אריינין אריינין איינין אייניין | lon of ¢ | for adva | ent to |
| AA HUMAA, P | locati | ind disa | nvo I verk |
| | aphical location of employment. | The opportunities for advancement: Advantages and disadvantages of the occupation. The nature of the work involved in the occupation. | The union involvement in the occupation. |
| | ğ | The c Advar occur The r | The coccul |

BUSINESS MACHINE SERVICING



TASK NO. I OBSERVING THE SYMPTONS TO DETERMINE THE DEFECTS OF A TYPEWRITER

| SUGGEST!.D EVALUATION PROCEDURES | Visual. Written e comination. Oral. | Visual. Written examination. Orai. | Visuai. Written examination. Orel. |
|--------------------------------------|--|---|---|
| SUGGESTED STUDENT ACTIVITIES | Create a situation so that the student can have the opportunity to question the operator. | Create a situation so that the student can have the opportunity to observe the operation of the typewriter. | Create a situation so that the student can operate the typewriter. |
| SUGGESTED INSTRUCTIONAL MATERIALS | Typewriters. Typewriter trouble shooters manual. and service repair manual. Tapes - teacher prepared. | Typewriters. Typewriter trouble shooters manual and service repair manual. Tapes - teacher prepared. | Typewriters. Typewriter trouble shooters manual. and service repair menual. Tapes - teacher prepared. |
| SUGESTED TEACHING METHODS | Instruct the students on methods of question- Ing. Use of local service man if possible. Teacher prepared tapes on customer compisaints. | instruct the students on methods of observation. | Instruct the students on the methods of operation of the typewriter. |
| AREA OF 14UMAN REQUIREMENT | Determine the defects of a typewriter by: (a) Discussion with the operator. | (b) Observation of the operation of the typewriter. | (c) Operation of the machine. |

TASK NO. 2 DISSEMBLING THE TYPEWRITER FOR CLEANING BY REMOVING THE PARTS THAT MAY BE AFFECTED BY THE CLEANING SOLVENT

| AREA OF HUMAN REQUIREMENT | SUGGESTED TEACHING METHODS | SUGGESTED INSTRUCTIONAL MATEPIALS | STUDENT ACTIVITIES | SUGGESTED EVALUATION PROCEDURES |
|--|----------------------------|--|--|---------------------------------|
| Benove the ribbon. | Demonstration and | Service repair manual. | Listening and observing demonstration. | Visual. |
| Remove the platen. | use of tapes. | Tools. Tables - teacher made. | Listening to tapes and responding on typewriters by: | Oral. |
| Remove the feed rolls. | | Assembled Typort 1 to 100 to 1 | Removing the platen. | |
| Remove the rubber feet. | | | Removing the feed rolls. | |
| Remove all other rubber or other fabric | | | Removing the rubber feet. | |
| parts that may be attected by the solvent. | | | Removing all other rubber or other | |
| Remove the carriage assembly. | | | tabric parts that may be attacted by the solvent. | |
| Remove all side and cover plates. | | | Removing the carriage assembly. | |
| Remove all electrical components | | | Removing all side and cover plates. | |
| | 1 | | Removing all electrical components and connecticys. | |



TASK NO. 3 CLEANING THE TYPENRITER TO REMOVE DIRT

| AREA OF HUMAN PEQUIPEVENT | SUPRESTED TEACHING METHODS | SUSGESTED . HISTOUCTIONAL MATERIALS | SUCCESTED STLCENT ACTIVITIES | SUGSESTED E.ALLATION PROCEDURES |
|--|-------------------------------|--|---|------------------------------------|
| | | | | |
| Following directions on cleaning solutions. | Lecture, | Service manual - tapes. | Observation. | Writter-oral exam. |
| Measurements of liquids. | Demonstration. | Ounce, quart, pint and gation containers. | Observation. | W itten-oral exam. |
| Understanding the flammable properties of solvents. | | Cleening solutions. | Observation | ¥r:tten-oral e>am. |
| Selecting the proper types of solutions for cleaning the typewriter. | Lecture. | Fire extinguisher, $(\infty_2$ or purple K) alcohof and matches. | | |
| Cleaning steps: | | | | |
| (a) Blowing loose dirt from the typewriter with compressed air. | Demonstration. | Service manual. Typewriter. Air compositor | Observe the proper steps in cleening the typewriter and repeat the concentration. | Written-oral-visual exam. |
| (b) Washing the typewriter with water to remove loose dirt. | | Water hose. Tank with solvent. | | |
| (c) Placing the typewriter in the cleaning solution. | | Light oil spray cans. Gloves. Googles. | | |
| (d) Placing the typewriter in an oven to evaporate all possible moisture | | Apron. | | |
| (e) Lubricating the typewriter by spraying with a light oil. | | | | |
| (f) Wearing protective clothing when working with cleaning agents and solvents. | | | | |
| (g) Applying proper ventilating procedures when working with cleaning agents and solvents. | | | | |
| | | , | | |

TASK IND. 4 ISOLATING THE MECHAPICAL DEFECTS TO A PARTICULAR SECTION OF THE TYPEWRITER

| AREA OF HUMAN REQUIREMENT | SUGGESTED TEACHING METHODS | SUGGESTED INSTRUCTIONAL MATERIALS | SUGGESTED STUDENT ACTIVITIES | SUGGESTED EVALUATION PROCEDUPES |
|--|--|---|--|---|
| Explaining the basic operation of the typewriter. | Demonstration with overlays and components. | Overlays - teacher prepared. I. Gariage mochanism. Z. Rocker trip. 3. Keylever-typetar mechanism. | Operate the typewriter. Explain the function of each section. | Written test. Oral test. visual test. |
| Explaining the function and movement of each section of the typewriter. | Ę | Components: Carriage mechanism. Rocker trip. Kaylever-Typebar mechanism. Film: "Besic Typing Machine Wethods," 20 mins., b & w, Visual'Alds Service, Univ. of iilinois, Champaign, iii. | | |
| Visually inspecting for broken parts, missing screws or other obvious defects. | Demonstrate specific problems and causes. Sar up problems for students to observe and interpret. | Typewriters. | Observe demonstration. Trouble shooting for malfunctioning parts. | Observation. |
| Reading the manufacturer's service reference chart for possible cause of defects. | Explain the organization of an instruction menual and how to use it. Set up defective typewriters. | Typewriters. Manuals corresponding to machines in use. | Determine the defect of his typerwriter by referring to service sensial. | Written test. Observation. |
| Eliminating the possible causes of the defect until the particular section is found. Checking clearances tutueen parts with a feelergage. | Set up situation and demonstrate the proper steps to eliminate the causes of trouble. | Typewriter. Service menuel. Charts on tools. Tools: Disessembly tools. Feeler gauge. | Create a situation where student determines the cause of trouble set up by partner (students work in pairs). | Observation. Oral examination. Written examination. |



TASK NO. 5 ISOLATING THE ELECTRICAL DEFECTS TO A PARTICULAR COMPONENT OF THE TYPEWRITER

| | | | |
|--------------------------------------|--|--|--|
| SUGGESTED EVALUATION PROCEDURES | Written examination. Oral examination. | Written – cral examination. | Written - orai-vis.al examination. |
| SUGGESTED STUDENT ACTIVITIES | Study these materials in order 70 recognize the parts of the type-writer and the causes of defects. | Observing demonstration. Reading menual. | Observation of demonstration. Test equipment or parts using maters - by method demonstrated by the instructor. |
| SUGGESTED INSTRUCTIONAL MATERIALS | Drawings specifications, manufacturer's catalogs, service manuals, schemetics and handbooks, | Menuels. Typewriter. Overlys - teacher prepared: motor. on-off switch. | Text or manuals. Charts - (mater). Good and defective electric.) parts. Volt mater. Continuity tester. New mater. Test leads. |
| SUGGESTED TEACHING METHODS | Distribute materials to students and explain the use of these. | Demonstration. | Demonstration. |
| AREA OF HUMAN REQUIREMENT | Interpreting drawings, specifications, manufacturer's catalogs, service manuals, schemetics and handbooks. | Recognizing the various electrical parts of the typewriter. | Interpreting meter readings to determine the condition of the components. Inspecting the components with a continuity tester VOM meter to eliminate the possible cause of trouble until the detective component is found. Selecting the appropriate electrical meters for the job to bo done. Connecting electrical meters in the propermanner. Observing safety precautions when working with live circuits. Datermining the correct method of inspecting, checking, and calibrating electrical meters. Recognizing the laportancy of properconnections of electrical maters. Applying the proper care, maintainence and storage of the electrical meters. |

| | | •• | ************************************** | Meleter - ceatc.c.al rearing. |
|--------|--|--|--|---|
| | H. S. L. C. | Sector demonstration. Translandenting for malfunctioning part. | Observe deministration. | Listening and ebserving demonstration. Listening to tapes and responding on type- writers by: Massing the platen. Massing the platen. Massing the responding. Massing the responding. Massing the case test. Massing the carriage essenbly. Massing the carriage essenbly. Massing the carriage essenbly. Massing all side and cover plates. Massing all electrical components and connections. |
| - | 「大学のでは、 100mm では、 100mm | Control of the contro | Corriging Control of C | Overlays - toucher propered. Memoils. Typeuriter. |
| : • | THE RESIDENCE OF THE PROPERTY. | Company (Pagelon o. the companion to.) | Campandents with errories | Commission of Ich. |
| | The first of the synchronic forms of the synchronic fo | | en freggebrand fan Grade mademand og en | Maximum - 2 11-4 The vertibus parts, atc. |

| | froublesharting arriter in the | |
|-------------------------|--|--|
| | Observe demonstration froubleshooting tor malfunctioning part. | |
| 11. 12. 4.Ab. VATA-11.2 | Typemeri *u··. | |
| ender a va | Destions and causes. Jet up problems for students to observe and interpret. | |
| · Why is go alone | missir, strems, or other objing defect. | |



TASK NO. 7 REMOVING THE DEFECTIVE PART(S) OF THE TYPEWRITER

| s Agan aga sa Agan a | Scoreda State | TUTE TEE | כברננטיב שלבויובונל ליינניים | out of the first of the |
|--|--|---|---|--------------------------------------|
| Interpreting drawings, specifications, manufacturer's catalogues, service manuals, schematics and handbooks, | Explain the use of drawings, specifications, and manufacturer's ratalogues. | Orawings, specifications, manufacturer's catalogues, service manuals. | Study the drawings, specification, manufacturer's catalogues, etc. | Written – orał examınation. |
| interp eding the manufacturer's diagrams to follow the movement of parts in the Typewriter. | Explain how to use the manufactuer's diagrams to follow the movements of parts in the type-writer, and/or use prerecorded tapes. | Manufacturer's diagrams. Typewriter. Tapos – teacher prepared. | Observe the manufacturer's diagrams to follow the movement of parts in the typewriter. | Written - oral examınation. |
| Recognizing the various parts of the typewriter. | Demonstration. | Overylays - teacher prepared. Manuels. Typewriter. | Create a situation so that the student can have the opportunity to question the operator. | - ora |
| | | | Create a struction so that the student can have the opportunity to observe the operation of the typewriter. | Written - Oral - Visual exprinction. |
| Selecting the proper type and size of: a. screwdrivers. b. piters. | Demonstrate the use, care, methods of application for tools. | Menuals. Typewriter. Screwdrivers. Pliers. | Create a situation so that the student can operate the typewriter. | Written - oral - visual examination |
| | | Wrenches. Cutters. | Observe demonstration. | Written - oral - visual examination |
| e. nutdrivers. Recognizing the proper methods of holding wrenches. | | Nutdrivers. | Refer to service manual to select proper tools to repair typewriter and remove parts. | • |
| Applying the proper methods of holding the work. | | | Practice using tools. | |
| Applying methods of holding pliers for pulling, pressing and twisting. | | | | |
| Recognizing the results of using pliers for removing nuts and bolts. | | | | |
| Applying the proper procedures for cutting with diagonal cutters. | 5 | | | |
| Datermining the proper methods of stripping wire. | ē, | | | |
| Recognizing the various types of fastening devices. | 91 | | | |
| Recognizing the various types, uses, and characteristics of threaded fasteners. | | | | |
| Recognizing the various types and uses of washers. | | | | |
| Applying the proper methods of installing threaded fasteners. | | | | |
| Recognizing the difference between right and left hand threads. | | | | |
| Applying the proper care, maintenance and starage of facts. | | | | |



Task No. 7 (continued)

TASK NO. 8 REPLACING THE DEFECTIVE PART(S) OF THE TYFEWRITER

| HUMAN REO! IDEVE: T | TUS ESTER TEACHING WETHODS | SUSTETED INSTRUCTIONAL MATERIALS | CTUENT ACTIVITIES | Season and the series |
|---|---|--|--|-------------------------------------|
| Interpreting drawings, specification, manufacturer's catalogues, service me.uul., schematics and handbooks. | Explain the use of drawings, specifications, manufacturer's catalogues. | Drawings, specification, service manuals, manufacturer's catalogues. Typewriter. | Observe demonstration. Listen to tapes and respond on typewriter by: | Written - oral - visual examination |
| | | | Removing the platen. | |
| | | | Removing the feed rolls. | |
| | | | Removing the rubber feet. | |
| | | | Removing all other rubber or other fabric parts that may be affected by the solvent. | |
| | | | Removing the cerriage assambly. | |
| | | | Removing all side and cover plates. | |
| | | | Removing all electrical components and connections. | |
| Recognition of various parts of the typewriter. | Demonstration. | Overylays - teacher prepared. Manuals. Typewriter. | Study these materials in order to recognize the parts of the typewriter and the causes of defects. | Written - oral examination. |
| | | | Observe demonstration. | Written - oral examination. |
| | | | Reed menuel. | |
| | | | Observe demonstration. | Written - oral - visual examination |
| | | | Test equipment or parts using meters by the method demonstrated by the instructor. | |
| Replacing the defective parts with the appropriate foots. | Demonstration. | Typesriter. | Observe demonstration. | Written - oral - visual examination |
| | | Service manuals. | Replace the defective part with the appropriate tools. | |
| Sexterior the defective parts with | 4 | | Observe demonstration. | Written - oral - visual examination |
| special tools. | special tools. | Special tools. Service menual. | Replace the defective parts with special tools. | |
| Lubricating parts to specification as | Demonstration using type- | | Observe demonstration. | Ariffen - Oral - Visual examiration |
| indicated in service menual. | writer to show proper methods of olling. | Oll can with oil. Rags. Service manuals. | Lubricate parts to specifications indicated in service manual. | |



| $\overline{}$ |
|---------------|
| ъ |
| |
| ž |
| z |
| _ |
| _ |
| • |
| 'n |
| - 75 |
| |
| Š |
| _ |
| |
| 8 |
| w |
| |
| • |
| 9 |
| - |
| • |
| |
| - 3 |
| Š |
| - 4 |
| |
| |

| Recognizing the various parts of the typewriter. Selecting the proper type and | | | | |
|--|--|--|--|-----------------------------|
| ecognizing the various parts of he typewriter. | | | | |
| box egyt regord edt politicele | Show the use, care, methods of application | Typew: I ter. Manual. | Observe the manufacturer's diagrams to follow the movement of parts in the typewriter. | Written - cral examination. |
| size of: | for tools. | Screwdriver. Pilers. Erecore | Listen to tapes. | |
| a. screwdrivers. b. pilers. | | Cutters. Nutdrivers. | | |
| c. wrenches. d. cutters. e. nutdrivers. | | | | |
| Applying the proper care, maintenance and storage of tools. | | | | |
| Recognizing the proper methods of holding wrenches. | | | | |
| Applying the proper methods of holding the work. | | | | |
| Applying methods of holding pilers for pulling, pressing and twisting. | | | | |
| Recognizing the results of using pilers for removing nuts and bolts. | | | | |
| Applying the proper procedures for cutting with diagonal cutters. | | | | |
| Determining the proper methods of stripping wire. | | | | |
| Recognizing the various types of fastening devices. | | | | |
| Recognizing the various types, uses and characteristics of threaded fasteners. | | | | |
| Recognizing the various types and uses of washers. | | | | |
| Applying the proper methods of installing threaded fasteners. | | | | |
| Recognizing the difference between right and left hand threads. | | | • | |
| Practicing safety preceutions noted in the service manual. | Lecture on safety. Demonstrate safe and proper method of manipulating tools and materials. | Typewriter. Service menuel. Tools. | Take notes on lecture Observe demonstration Read service manuel | Written exam Oral exam |



TASK NO. 9 REASSEMBLING THE REPAIRED TYPEWRITER

| AREA OF HUMAN REQUIREMENT | SUIGESTED TEACHING METHODS | SUGGESTED INSTRUCTIONAL MATERIALS | SUGGESTED STUGENT ACTIVITIES | SUGGESTED EVALLATION PROCEDURES |
|---|--|--|--|-------------------------------------|
| Interpreting drawings, specifications, manufacturer's catalogues, service manuals, schematics and handbooks. | Distribute materials to students and explain the use of materials. | Drawings. Specifications. Manufacturer's catalogues. Service manuals. Schamatics. Hand tools. | Study these materials in order to recognize the part; of the typewriter and the causes of defects. | Written – oral examination. |
| Hecognizing the various parts of the typewriter. | Demonstration. | Overlays - teacher prepared. Typewriter. Manuals. | Observe demonstration. Reeding menual. | Written - oral examination. |
| Recognizing the various parts of the typewritar. Selecting the proper type and size of: a. screadrivers. c. urenches. d. cutters e. nutdrivers. Applying the proper care, maintenance and storage of tools. Recognizing the proper methods of holding urenches. Applying the proper methods of holding the work. Applying the proper methods of holding the work. Applying the proper methods of holding the user. Applying the proper methods of holding pilers for removing nuts and boirs. Recognizing the proper procedures for cutting with diagonal cutters. Determining the proper methods of stripping wire. | Show the use, care, mathods of application for tools. | Menuals. Tools: Screen lver. Pilers. Wrenches. Cutters. Nutdrivers. | Mater to service menual to select proper tools to repair typewriter and remove parts. Practice using tools. | Written - oral -visual examination. |
| Recognizing the various types, uses, and characteristics of threaded featmers. Recognizing the various types and uses of weshers. | | | , | |

Task No. 9 (continued)

| | | |
|------------------------------------|--|--|
| | Written - oral - visual examination | otion |
| SUGGESTED EVALLATION PROCEDURES | oral - visua | Oral - visual exemination |
| SL EVALLATE | Written - | Oral - v |
| | <u>.</u> | iter cated |
| 531. | rion. paired typeur ate tools. | tion. paired typewr tools as indi nual. |
| SUGGESTED STLDENT ACTIVITIES | Observe demonstration. Ressemble the repaired typewriter with the appropriate fools. | Observe demonstration. Reassamble the repaired typewriter with special handtools as indicated by the service manual. |
| ST | 8 <u>6 3</u> 2 8 ± | 88 gray |
| | | |
| GESTED NAL MATEPIALS | <u>-</u> : | |
| SUGGESTED INSTRUCTIONAL MATERI | Tools. Service manuel. Typewriter. | Special tools. Typewriter. Service manual. |
| | | |
| SUGGESTED TEACHING METHODS | Demonstration using tools and typewriter. | Demonstration using special tools. |
| 7EAC | 9 5 | |
| | paired type- late tools. | paired type- hand tools a ervice manual. |
| AREA CF HJAGN REQUIREMENT | Ressembling the repaired type- writer with appropriate tools. | Reassembling the repaired type- writer with special hand tools as indicated by the service manual. |
| H | Ressi | Reass erite indic |
| | <u> </u> | |

TASK NO. 10 TESTING THE OPERATION OF THE REPAIRED TYPEWRITER

| AREA OF HJAAN REQUIREMENT | SUGGESTED TEACHING METHODS | SUGGESTED INSTRUCTIONAL MATERIALS | SUCCENT ACTIVITIES | S.GSESTED EVALUATION PROCEDURES |
|---|--|---|--|---|
| Interpreting instructions from service menual for check points on the typewriter. | Explain how to use the service manual to check point Typewriter. | Typewriter. Service manual. Toois. | Interprating instructions from service manual for check points on the type-writer. Operating repaired typewriters. | Written - oral examination. |
| Explaining the basic operation of the typewriter. | Demons-ration. | Overlays-teacher prepared. 1. Carriage mechanism. 2. Rocker frip. 3. Keyiever-typebar machanism. | Operate the typewriter. Explain the function of each section. View film. | Written test. Oral test. Visual test. |
| Explain the function and movement of each part of the typewriter. | Demonstration. | Overlays - teacher prepared. 1. Carriage. 2. Mainspring. 3. Morion & shift mechanism. 4. Piaten. 5. Variable. 6. Ring & cylinder. 7. Line space lever. 8. Margin stops. 9. Rock, pinion, & starwheel. 10. Universal bar. 11. Escapement action. 12. Space bar. | Observe demonstration. Troubleshooting for melfunctioning part. | Oral exam. Visual exam. |
| Operating the typewriter to determine performence. | Demonstration on operating typewriter to determine performance. | Typeuriter. Service manuel. Tools. | Operating the typoxriter so desemine performence. | (raf - vicual exemination. |



OCCUPATIONAL INFORMATION FOR BUSINESS MACHINE SERVICING

| | , | | | _ | | | , |
|------------------------------------|--|---|--|---|--|--|--|
| SUGGESTED EVALUATION PROCEDURES | Oral questioning. | Oral quetioning. | Oral questioning. Discussion of field trip. | Cral questioning. Discussion of field trip. | Oral questioning. | Oral questioning. | Oral excellention. |
| SUCCESTED STUDENT ACTIVITIES | Listening to lecture. Observing graphs. Reading bulletins and classified ads. | Listening to lecture. Georying graphs. | Listening to lecture. Reading buildtins and letters from manufacturers and technical achaels. Field frip to a repoir abop. | Listening to lecture. Field trip to repair shap to chaerve and discuss working conditions with men in shap. | Listening to lecture. Read U.S. Department of Labor builetin \$1450-13 and letters from repair shap and technical achools. | Listening to lecture. Observing maps and graphs. | Listen to lecture. Amed U.S. D. wriment of Labor bulletin \$1450-13 and letters from repair shops and manufactu. WTs. |
| SUGGESTED INSTRUCTIONAL MATERIALS | Graphs - fractor-properte. Builetine. Ospartment of Labor Builetin # 1450-13. Local mergapers. Organisation (Machington, Unablington, Unablin | Graphe or transparencies. Lecal Union Headquarters: 1126 16th Street, N.W., Washington, D.C. | Bulletins and letters from manu- factures, and technical acheels. Local service shap. Bulletin #1450-13, U.S. Department of Laber. | Local repoir sing. Bulletin (1650-15, Department of Labor. | Bulletin \$1450-13, Department of Labor. Lutter from repolt shape and technical schools. | Haps and graphs. Latters to national manufacturars. | Builetin \$1450-13, Department of Labor. Letturs from repair shaps and manufacturers. |
| SUGGESTED TEACHING METHODS | Lacture using graphs. Classified ads. | Lecture using graphs. Lecal union representa- tivo. | Lecture. Building and lufters from manufacturers and technical achies. Visiting a repair shap. | Lecture. Field trip to a repair sheep to observe and discuss consistence with the man in sheep. | Discussion - teacher directed or by guidence communier. | Lactera. | Local services. |
| AREA OF HJAAN PEQUIRENENT | The employment entlook: 1. Lacel 2. National | 1. Local 1. Local 2. seprentice (2) journamen 3. near-miss (2) entry way (2) entry way (2) entry way | Types of training available: 1. Apprenticabiles 2. Technical or trade achools. 3. On-the-jeb. | The working conditions experienced in the occupation. | Physical and mental characteristics meshed for qualification for employment. | Geographical location of employment. | The apportunities for advancement. |



OCCUPATIONAL INFORMATION UNIT FOR BUSINESS MACHINE SERVICING (continued)

| AREA OF HUMAN FEQUIREMENT | SUGGESTED TEACHINS METHODS | SUGGESTED INSTRUCTIONAL MATEPIALS | STUDENT ACTIVITIES | SUCCESTED EVALUATION PROCESSES |
|---|---------------------------------|--|--|--|
| The advantages and disadvantages of the occupation. | Lecture - and/or field trip. | Bulletin #1450-13, Department of Labor. Field 7rip to discuss work with men in shop. | Listen to lecture. Read U.S. Department of Labor bulletin #1450-13. | Oral examination and discussion of field trip. |
| the nature of the work involved in the orcupation. | Lecture – and/or fleid trip. | Bulletin \$1450-13, Department of Labor. Lafters from menufacturers' and repair shops. Field trip to repair shop. | Listen to lecture. Meed U.S. Department of Labor buildtin #1450-13 and letters from menufacturers and repair shops. Field trip to repair shop to observe and discuss nature of work with men in shop. | Oral examination and discussion of field trip. |



HOME APPLIANCE SERVICING

| | | 17、18、17、17、17、18、17、18、18、18、18、18、18、18、18、18、18、18、18、18、 | The second of th | | There is a second of the second secon | とのできる。 日本・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・ |
|-------------|--|--|--|--|--|---|
| - | The state of the s | den benangt tag ge dan den in ten inde gere group gene gene gene gene gene gene gene gen | Continued and Comment to the Space.com | Play the appliance ists a marrabidition of the second state of the | 6111 mph spooling cumbed bindes. | States to tacture to State grand, Jugitering |
| - | Figure 64.0 Figure | | | | Perfection transfer. Perfection Office of the Lating Confession of the | Code and a code |
| - | | **** | * 1 * * * * * * * * * * * * * * * * * * | • | | Dimitors from the |
| - - - | | | egide Meriden i filozofia de de despeta de la filozofia de la | | | and the confidence of the confidence of the |



the second of the contract of the second of the second second second second second second second second second

ERIC **
**Full Text Provided by ERIC

| - M | Written quiz on reference materia: write an order for a replecement part. Observe the proper use of special fails. | Observe the correct usage of screed overs. | Observe the use of erenches by students. | Observe students at work. | Observe students at work. |
|----------------------|---|---|---|---|--|
| HEAT A MARKETA | Rending drewings, schematics, specifications, and catalogues. Identititying components from drawings. Identitying special tools. Mriting the specifications for defective parts. | Pick and the screedriver that filts the job you are deing. | solect the wrench that fits the job without demagn. | Helding, handling, and using toxis correctly. | Morking with pliers in the ranner recommended in "ABC's" of Vandtools." |
| SCHOOL SA WATERIA. | Manufacturer's service manual. Fars List Textbooks: Electrical Appliance Servicing, William H. Crouse, 1.C.S., Scranton, Pa., Serial 6729A (1965), p. 1-32. How to Repair Seell Applicances, Jack Borr, Heward W. Sema & Co., Inc., (1965), p. 113. Major Appliance Servicing, Percy T. Brockwell, Jr. Writzer-Hill Book Co., (1996), p. 211. | Ascortment of screes (head type). Screedrivers. | Assortment of erenches. A job situation (appliance). A Mac's of Hend Tools, free publication by Edwinel Motors, Detroit, Mich. | Assorted hand erenches. | Assortment of pilers: Silp joint Combination Needle rose Vice grip, etc. |
| L - VIDA AIM VI | Commonstratit. Lecturoractical more. | Demonstration. Lecture. | Despustration. Lecture. | Describetion. Practical work. | Demonstration. Practical work. |
| In let ∴ let venethe | interpreting drawings, specifications, manuals, manuals arrangements of alloques, servi of manuals, schedules, servi of manuals, schedules and mathematical procedures and fechiciques, to lype, function and rating of defective part. (2) Electrical supplies. (3) Electrical service fools. (4) Electrical code. | Selecting the proper type, size and tip of screedriver for the job to be done: (a) Regular (b) Referent (c) Offsot (d) Spiral (e) Insulated (f) wedge, clip (scree holding) (g) Standard slot (h) Phillips (v) Square socket | Selecting the proper eranches for the job to be done: (a) Open end (b) Box end (c) Socket with ratchet & extensions (d) Adjustable (e) Spanner (hook, tece, special) | Macognizing the proper mathod of holding wrenches. | Selecting the proper type, size and characteristics of pliers for the work to be done: (a) Silp joint (b) Combination (c) Long, round, & needle nose (d) Crimping (e) Vice grip |

Task No. 2 (continued)

| SUGGESTED EVALUATION PROCESURES | Observe the correct usage of pliers. | Observe students. | Student demonstrates his ability to secure work to prevent accidents and facilitate repairs. | Observe students at work. | Observe students cutting correctly. | Observe students correctly strip wire. | Observing students working with tools. | Inspection of care, maintenance, and storage of tools. |
|--------------------------------------|--|---|--|--|---|---|---|---|
| SUGGESTED STUDENT ACTIVITIES | Remove nut from bolt with pilers and Observe damage. | Weisting, politing, and pressing with pilers. Observ | Securing work for safe operation. Stude securing factions of the security of the security sec | Selecting the proper cutter for the Observ job to be done. | Outfing wire with diagonal cutters. Obser | Removing the insulation from vires Observith pilers. | Namoving and installing bolts and nuts Observelth nutdelvers. | Meintaining toxols in a working condition. |
| SUGGESTED INSTRUCTIONAL MATERIALS | Pliers. Rand bolts. o | Pliers. | Holding devices: Clamps Vices | Cutters. Knives. Wire strippers. Assortment of wire sizes. | Quters. | Mire strippers. Mire. Textbook: Reliable Electrical Connections, Technology Handbook, 3rd edition, NASA Sp-2002, George C. Mershall, Space Flight Center, Huntsville, Alabame, Dec. 1963, James A. Gey, Jr. | Nutdrivers. Buits. Textbook: ABC's of Hand Tools, free publication by General Motors, inc., Detroit, Mich., p. 211. | ABC's of Hand Tools, free publication by General Motors, Inc., Detroit, Mich. |
| SUGGESTED TEACHING WETHODS | Demonstration. | Demonstration. | Demonstration, Practical work. | Demonstration. Practical work. | Demonstration. Practical work. | Demonstration. Practical work. | Demonstration. Prectical work. | Demonstration. Prectical work. |
| ARFA OF HUMAN REQUIPEMENT | Recognizing the results of using pliers for resoving nuts and boits. | Applying methods of holding pliers for pulling, pressing, and twisting. | Applying the proper methods of holding work. | Selecting the proper types and sizes of cutters for the job to be done. (a) Side, end and diagonal (b) Wire stripper (c) Knives | Applying the proper procedures for cutting with diagonal cutters. | Determining the proper mathod of stripping wire. | Selecting the proper size and type of nutdriver for the job to be done. | Applying the proper care, maintenance and storage of tools. |



Task No. 2 (continued)

| AREA OF HUMAN REQUIPEMENT | SUPPLESTED TEACHING METHODS | SUGGESTED INSTRUCTIONAL MATERIALS | SUGGESTEC STUDENT ACTIVITIES | SIGGESTED EVALLATION PROCEDURES |
|---|-------------------------------------|--|--|---|
| Recognizing the various types of fastening devices: (a) Threaded fasteners Boit and nut Cap screw Machine screw Set screw Set screw Sheet metal & self-tapping screw Stud boit (b) Keys, rivots & springs (c) Cofferpins & sheer pins (d) Retaining rings. | Demonstration. Practical work. | Various fastening devices. | Working with various fastaning devices to determine the characteristics of each. | Observe the use of tastening devices. Quiz on the uses of different fastening devices. |
| Recognizing the various types & uses of mashers. | Demonstration. Display. | Assortment of various weshers. | Student determines the correct usage of usahers. | Observe the proper application of washers. |
| Applying the proper methods of installing threaded fusteners. | Demonstration. Practical work. | Handfools: Wrenches Mutdivers Screedrivers Threaded festamers | Installing threaded fasteners in the appliance. | Observe the correct usage of tools as to not damage threaded fasteners. |
| Recognizing the difference between right and left hand threads. | Damonstration. Practical work. | Parts manual. Service manuels. Left hand threads. Right hand threads. | Student will identify left and right hand threads. Need service manual end parts manual for application of left hand threads. | Test students ablility to read service manual to determine location of left hand threads. |
| Applying the proper safety praceutions: (a) Wearing safety shoes with non-conducting soles. (b) Removing jeweiry & Items of clothing with metal fasteners. (c) Providing work situations where moisture is present. (d) Disconnecting the appliance before attempting servicing. (e) Properly grounding appliance. | Despustration. Lecture. Film. | Defective appliance. V.O.M. Film: "The Factory: Now e Product is Need," borrow from Encyclopedie Britanie. Britanie. Fertbooks: Now to Rapair Electrica! Appliances, Book Z, H. P. Manily, Frederick J. Drake & Co., Publishers (1964), p. 265. How to Rapair Small Appliances, Jack Derr, Howerd W. Same & Co., Inc. (1965), p. 95. | Students will observe setety rules and regulations. Listen to film on sefety. Match demonstration of effects of shorted, ungrounded appliance. | Quiz on safety rules and regulations. |
| Removing the festeners and the cover plate of the appliance with the appropriate fools. | Demonstration. Practical work. | Service manuals. Textbook: How to Regalr Small Appliances, Jack Darr, Howard W. Sons and Co., Inc. (1965), Chapter 1. | Students will correctly, according to the reference, remove the cover plates from the appliance. | Observe students using the service manual. |
| | | | | |



TASK NO. 5: ESSLATING THE BEFECT TO A PARTICULAR SECTION OF THE HEATING ELEMENT APPLIANCE

| | | | | | | - |
|-----------------------------------|--|--|---|--|--|--|
| EVALLATI ", PROCET AF | Written quiz on reference material. Write an order for a replacement part. Observe the proper use of special twis. | Quiz on service reference charts to check reading comprehension of students. | Quiz on identification of faulty components as detected with instruments. | Quiz on Chai's Law. | Quiz on +11m. | Elsten for misinformetion. |
| STUTENT ACTIVITIES | Reading drawings, schematics, specifications, and catalogues. Identifying components from drawings. Identifying special fools. Writing the specifications for defective perts. | Reading troubleshooting chart to destermine cause of fallure of the appliance. | Myseling maters connected to components to determine their condition. | Computing Ohm's Law problems. | Listening to film. | Students lecture to their group, explaining the operation of an appliance. |
| SUCTESTED INSTRUCTIONAL WATERIALS | Manufacturar's service manual. Parts Lists. Tarbooks: Electrical Appliance Servicing, WITHISM H. Crouse, T.C.S. Scranton, Pa., Serial 6729A (1965), p. 1-25, How to Repair Small Appliances, Jack Darr, Howard M. Same & Co., Inc., (1965), p. 115. Major Appliance Servicing, Percy T. Ma | Service reference. Charts for various appliances. | Continuity tester. V.O.M. Heating element appliances. Textbook: How to Repair Electrical Appliances, Book Z. H. P. Wenty, Frederick J. Drake & Co.Publishers, Chapter 16. | Quiz on Ohm's Lew. | Flims: "introduction to Electricity," Cornet Files, Milmette, ili berrow from Encyclopedia Britannica. "Masic Electricity - The Electron Theory," 3 min., Cornet Films, Milmette, Ili., borrow from Encyclopedia Britannica. | An appliance: Toasfar Coffee maker Room heater |
| SULATORED | Demonstration. Lecturer. Practical work. | independent reading. | Demonstration. Practical work. | Practical work. | <u>f</u> | Demonstration. Lecture. Practical work. |
| AREA OF Haman Regi i Rement | interpreting drawings, specifications, manufacturar's catalogues, service manuals, schematics and handbooks to determine: (a) Installation procedures & tachniques. (b) Service procedures. (c) Type, function & rating of defective part. (d) Electrical supplies. (f) Special service tools. (g) Electrical code. | Reading the menutecturer's service reference chart for possible causes of the frouble. | Interpreting meter resaings to determine the condition of components. | Computing Ohm's Law to determine ampenage, voitage and resistance. | Explaining the electron theory of current flow in the aepliance. | Explaining the besic operation of the appliance. |

ask ho, 3 (untinued)

| CLECTETTON FRUTTER | Observe the connection of meters in a circuit by students. | Quiz on identification of meters and their function. | Observe the storage and maintenance of electrical merers. | Check maters for correct celibration. | Check to see that students are recognizing obvious defects. | |
|--------------------------------------|--|---|--|--|---|--|
| SUCCESTEC STUDENT ACTIVITIES | Connecting meters in a circuit correctly. | Students will determine test to be made and select a mater accordingly. | Maintaining maters in proper working condition. | Calibrating maters according to the menual peculiar to the mater. | inspecting appliances for obvious defects such as broken line, plug and socket, efc. | |
| SUGGESTED INSTRUCTIONAL MATERIALS | Continuity tester. Y.O.W. Textbooks: How to Repair Electrical Appliances, Book 2, H. P. Manly, Fraderick J. Drake & Co., Publishers, p. 273. Simplified Electrical Appliance Servicing, Arthur Stephone, Simpson Electric Company (1966), Chicago, Ill. | Voltmeters Amenter Continuity V.O.M. Textbooks: Now to Repair Electrical Appliances, Teods Z, H. P. Henly, Frederick J. Drake & Co., Publishers, p. 284. Simplifyed Electrical Appliance Servicing, Arthur Stephens, Simpson Electric Company (1965), Chicago, III. | Textbooks: Now to Repair Najor Appliances, Ernest Tricosi, Heserd N. Semal & Co., Inc., (1966), Chapter I. Simplified Electrical Appliance Servicing, Arthur Stephons, Sispson Electric Company (1966), Chicago, III., p. 2-3. | Menuals. Menuals. Tentbook: Simplified Electrical Appliance Servicing, Arthur Stephons, Simpson Liectric Compney (1966), Chicago, III. | Defective appliances. Textbook: How to Mapair Small Appliances, Jack Darr, Howard W. Same & Co., Inc., (1965), Chapter 2. | |
| SUG ESTED TEACHTRE WETHODS | Demonstration. Practical work. | Demonstration. | Demonstration. Practical work. | Demonstration. Practical work. | Practical work. | |
| APEA OF HUMAN REQUIREMENT | Facognizing the importance of proper connection of appropriate electrical implars. | Selecting the appropriate electrical maters for the job to be done. (a) Voltmaters (b) Momentar or Amp probe (c) Continuity tester (d) Volt-Ohm mater (V.O.M.) | Applying the proper cere, maintenance, and storage of electrical maters. | Determining the correct mathod of inspecting, checking, calibrating electrical maters to known standards. | Visually inspecting for obvious electrical defects in the appliance. | |

| | • |
|---|---|
| 1 | 2 |
| į | Ē |
| • | 2 |
| | ^ |
| ; | 9 |
| | 7 |
| | |

| | t | | \$ 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 | |
|-------------------------------|---|--|--|--|
| em in Dect to Law tyte. | Test on student performance in connecting electrical meters. | Oveck students ability to lucate defectives components with electrical maters. | Check resistance and voltage measurements against known values. | |
| CT-CENT ACTIVITIES | Students will connect maters in a circult according to manual. | Testing components to localize the maifunction in the appliance. | spallances of the voltage and resistance in the appliances of the volt-Desember. Reserving mater residings on job sheet. | |
| LA POTEC INCHALL WATERIAL | Appliances. Electrical meters: V.O.M. Amp-meter probe Continuity tester. Testbook: Simplifiee Electrical Appliance Servicing, Arthur Stephone, Simpson Electric Company (1966), Chicago, 111. | Electrical maters: V.O.M. Appendix How to Replicable in the feet bearing and the feet beari | Appliance (small). V.O.M.'s. V.O.M.'s. Tertbook: New to Mapair Electrical Appliance. New to Mapair Electrical Appliance. New to Mapair Electrical Frederick.j. Drake & Co., Publishers, p. 270-271. Significal Electrical Appliance Servicing, Arthur Stephens, Simpson Electric Company (1966), Olicage, 111. | |
| TO FSTE. TEALHTH METHODS | Descrical work. | Practical work. | Demonstration. Practical work. | |
| AFFA OF HUMAN PEC, LEFMENT | Connecting electrical meters in the proper manner. | Inspecting the electrical components with the appropriate electrical maters to locate the defective section. | Determining voltage and resistance in the appliance with a volt-Okm mater. | |

TASK NO 4: 1'SLATING THE SEFECT TO A PARTICULAR COMPONENT OF THE HEATING ELEMENT APPLIANCE

| CJGFSFEE EVALLATION DROCFOLDES | Written quiz on reference material. Write an order for e replacement part. Observe the proper use of special tools. | Quiz on identification of faulty components as detected bith instruments. | Checksheet as to accuracy of interpretation. | Quiz on Ohm's Law. | Quiz on film. | Observe the correct application of electrical maters. | Observe the use of meters. Check students abiilty to recognize defective components. |
|--------------------------------------|---|--|--|---|---|---|--|
| SUGGESTED STUTENT ACTIVITIES | Reading drawings, schemetics, specifications, and catelogues. Identifying components from drawings. Identifying speciel tools. Mriting the specifications for defective parts. | Realing eaters connected to components to determine their condition. Hooking up the V.O.M. to components. | Reading date plates and following instructions. | Computing Ohm's Law problems. | Listening to film. | inspecting the appliance with electrical mayers to determine grounds. | Examine each accessory visually and with e V.O.M. as required to defermine defective parts or components. |
| SUGGESTED INSTRUCTIONAL MATERIALS | Manufacturer's service manuel. Parts Lists. Textbooks: Electrical Appliance Servicing, William H. Crouse, T.C.S. Scrarfon, Pa., Serial 672A (1965), p. 1-32. How to Repair Small Appliances, Jack Darr, Howard W. Same & Co., Inc., (1969), p. 113. Brockeell, Jr. Robraw-Hill Book Co., (1950), p. 211. | Heating element appliance. v.o.m. Continuity tester. Textbook: How to Repair Electrical Appliances, Book Z, H. P. Renly (1964), Freferick J. Drake & Co., Publishers | Unit data plates. Service manuels. | Quiz on Ofm's Law. | Film: "Electrons," 10 min., rent from Encyclopedie Brifannice. | Small appilances. V.O.M. | Defective appliance accessories. V.O.M. |
| SUSSESTED TEACHING METHODS | Demonstration. Lecture. Practical work. | Demonstration. Practical work. | Demonstration. Lecture. | Practical work. | <u></u> | Demonstration. Practical work. | Demonstration. Practical work. |
| APEA OF HUMAN REQUIPEMENT | interpreting drawings, specifications, manufacturer's catalogues, service manuals, schematics and handbooks to determine: (a) Installation procedures & techniques. (b) Service procedures. (c) Type, function & rating of detective part. (d) Electrical supplies. (e) Special service tools. (f) Electrical rode. | Interpreting meter readings to determine condition of components. | Interpreting instructions and information located on the data plate of the unit. | Computing Ohm's Law to determine amorrage, voltage and resistance | Explaining the electron theory of current flow in the appliance. | Applying the proper methods of checking for electrical grounds. | Inspecting the appliance for defective accessories: (a) Blanket & pad material (b) Plastic foot & handles (c) Insulation (d) Pilot lights (e) Grill pletes. |

| Demonstration. Demonstration. Practical work. Practical work. Exertical work. Exertical work. Fractical work. Fractical work. Fractical work. Fractical work. Fractical work. Fracture. Fills. | 5-35-50 WWW 35-00 February February 5-35-50 WWW 35-00 February 5-35-50 Feb |
|--|--|
|--|--|

Fask No. 4 (continued)

ERIC Front Provided by ERIC

| و۴۷، همارهٔ فقررون ek | Performance test on connecting electrical maters. | Daternine students ability to recognize a defective switch after testing. | Deferative students ability to recognize a defective heating element assembly. | Determine students ability to locate defective electrical connections with maters. | Check resistance and voltage measurements against known values. | Test students ability to recognize a defect in cord and plug and to recognize a good one. |
|--------------------------------------|--|--|--|--|---|---|
| SUCCETTED STUTENT ACTIVITIES | Connect maters in a circuit according to manual. | Testing suitches with maters and testers to determine the condition of components. | Testing the heating element assembly with markets. | Testing connections for defects with meters. | Messuring the voltage and resistence in the appliance with e V.O.M | Determine e defect in the cord and plug from observation. |
| C PRESTED INSTRUCTIONAL MATERIALS | Appliances. Electrical maters: V.o.M. New-mater probe Continuity tester Textbook: Simplified Electrical Appliance Servicing, Arthur Stephons, Simpson Electric Company (1966), Ohicago, III. | Continuity tester. V.O.M. Smell heating element appliance. Geod and defective switch. | V.O.M. Continuity testers. Hearing elements (essorted). Tentbooks: Simplified Electrical Appliance Servicing. Arthur Stephons. Simpson Electric Company (1966). Chicago, III., p. 12-13. | Continuity testers. V.O.M. Small appliance. Tenteck: Simplified Electrical Appliance Servicing, Arthur Simples. Simpson Electric Company (1966). Onicago, III. | Appilances (smail). V.O.M.'s. Textbooks: How to Repair Electrical Appilances, Book Z, H. P. Manly (1964). Fraderick J. Drawa & Co., Publishers. Simplified Electrical Appilance Servicing, Arfhur Stephons, Simpson Electric Campany (1966), Chicago, 111. | Faulty cord and plug. Good cord and plug. |
| SUR ESTEL TEACHINS METHOUS | Demonstration. Practical work. | Demonstration. Practical work. | Dumonstration. Practical work. | Practical work. | Demonstration. Practical work. | Demonstration. Practical work. |
| AREA OF HUMAN REQUIRENENT | Connecting the electrical meters '', the proper manner. | Inpsecting the switch in the heating element appliance for defects with a continuity tester or the appropriate electrical mater. | Inspecting the heating element assembly for defects with a continuity tester or the appropriate electrical maters. | Inspecting the internal wiring connections for defects with a continuity testers or the appropriate electrical meter. | Determining voltage and resistance in the appliance with a volt-Ohm mater. | Visually inspecting for obvious defects in the cord and plug of the appliance. |

TASK NO. 5: REPLACING THE SCFEUTIVE PARTICS) OF SMALL HEATING ELEMENT APPLIANCE

| STUDENT ACTIVITIES EVALUATION PROCEDURES | Reading drawings, schematics, specifications, and catalogues. Cations, and catalogues. Identifying components from drawings. Identifying special tools. Mriting the specifications for defective parts. | problems. Quiz on Onm's Law. | Quiz on file. to show a series Oheck schematics. | Observation of students in selecting correct heating element for a perficuler appliance. | and defermine the different Quiz on identification of terminal block. blocks. | Study references and making connections to Check wire connections and mounting mount a heating element in an appliance, procedures. |
|--|---|---|--|---|--|---|
| STUDENT | Reading drawings, schematics, specifications, and catalogues. Identifying components from drawings. Identifying special tools. Writing the specifications for defect parts. | Computing Ohm's Law problems. | Listening to flim. Making a schemetic to show circuit, perallel circuit. | Examining herting elements. Determining correct element from specifications. | Study references and dete types of terminal blocks. | Study references as mount a heating els |
| SJOCESTED INSTPUCTIONAL WATERIALS | Menufacturer's service manual. Parts Lists. Textbooks: Mejor Appliance Servicing, Percy T. Brockwell, Jr., McGraw-Hill Book Co., 1958, N.Y. How to Repair Small Appliances, Jack Derr, Howard M. Sams & Co., Inc., (1965). Electrical Appliance Servicing. William M. Grouse, I.C.S., Scranton, Pe., Serial 6729A (1965). | Quiz on Ohm's Law. | Circuit board. Schemples. Files "Elements of Electric Circuits," rent from Encylopedia Britannica. | Assertant of heating elements. Tertbeste: How to Repair Rejer Apiliances, Ernest Tricomi, Neveral W. Sams & Co., Inc. (1966), p. 85. | Terminal blocks. Tertbooks: How to Repair Electrical Appliances, Book Z. H. P. Henly (1964) Freedrick J. Draho & Co., Publishers, pp. 156-56. How to Repair Najor Appliances, Ernest Tricomi, Howard H. Sems & Co., 1958, N.Y., p. 51. | Examples of various types of elements. Applicance: Textends: How to Repair Seal! Applicance, Jack Derr, Howard N. State & Co., Inc. (1966)., Ougsters |
| SUICESTED TEACHING METHODS | Demonstration. Practical work. Lecture. | Practical work. | Demonstration. File. | Demonstration. Practical work. | Individual wark. | Practical work. |
| AREA OF HUMAN PEÇU! PEMENT | Interpreting drawings, specifications, manufacturer's catalogues, service manuals, schematics and handbooks to detarmine: (a) Installation procedures & techniques. (b) Service procedures. (c) Type, function & rating of defective part. (d) Elactrical supplies. (e) Special service tools. (f) Electrical code. | Computing Ohm's Lew to determine amperage, voitage, and resistance. | Explaining the characteristics of series of parallel circuits used in the appliance. | Selecting the proper types of heating elements for a particular appliance: (a) Particular appliance (b) Open (c) Sealed (d) Glass panel (a) Infra red (f) Thermo-electric | identifying different types, purposes, and uses of terminal blocks. | Necognizing the proper eathods of mounting and wiring heating elements. |

Task No. 5 (continued)

| FyA, #117, 56 3 551 | Inspect t'e correct spacing in the heating coll. | Observe the correct usage of focts. | Observe students at mort. | Student demonstrate his ability to secure work to prevent accidents. | Observe students. | Observe the correct usage of pliers. | Observe students cutting correctly. | Observe students stripping wire. |
|--------------------------------------|--|--|---|--|--|---|---|---|
| STRENT ACTIVITIES | Stratching open type heating elements before installing in the appliance. | Exemining different types of: Screedivers. Pilors. Merchies. Merterivers. Using the teels for the purpose for shich they were intended. | Neiding, handling and using Neels correctly. | Securing work for safe operation. | Teleting, pulling, and preseing sith pliers. | Remove net free bolt with pilors and deserte demaps. | Octing wire with diagonal cuffers. | Numbring the insulgiton from ultra |
| SUSSECTER INSTRUCTIONAL WATERIALS | Open type heating elements. Textbook: How to Repair Ses! Appliances, Ernest Tricom!, Howert W. Same & Co., Inc. (1965), pp. 61, 85-86. | Screenfluers. Filars. Writerluers. National law to Repair Small Appliances. May to Repair Small Appliances. Ack Derr, Nameral B. Sales & Ds., Inc. (1965), p. 113. | Asserted hand orestoks. | Holding devices: clamps vices | | Pilors. Note and boilts. | Cutters. | ulre strippers. ulre. Sertenet: Reliable Electrical Connections, Yechnelogy Handlent, NAS SE-2002, George C. Marshell Space Flight Center, Hantsville, Alabama (Dec. 1963), James A. Say, Jr. |
| Trachin Methys | Practical work. | Demostration. Practical work. | Demonstration. Practical wark. | Demostration. Prectical wark. | Beenstration. | Remetration. | Dummestration. Practical work. | Demostration. Practical work. |
| AREA OF HUMAN REQUIPEMENT | Recognizing the importance of even stretching when installing open type heating elements. | selecting the proper type and size of: (a) Scrawdrivers (b) Fliers (c) Wrenches (d) Cutters (e) Nutdrivers | Recognizing the proper methods of holding erenches. | Applying the proper authods of holding the work. | Applying mathods of holding pliers for pulling, pressing and twistling. | Recognizing the results of using pilers for resoving nuts and boits. | Applying the proper procedures for cutting with diagonal cutters. | Outpraining the proper methods of stripping wire. |

Task No. 5 (continued)

| SUGGESTED EVALUATION PROCEDURES | Observe the use of featening devices. Quiz on the use of various featening devices. | Observe the proper application of washers. | Observe the correct usage of tools as to not damage threaded festeners. | Test students ability to read service manual to determine location of left hand threads. | Quiz on sefety rules and regulations. | Observe the installation procedures. |
|--------------------------------------|---|--|--|--|---|---|
| SUGGESTED STUDENT ACTIVITIES | Working with various festening devices to determine the characteristics of each. | Determine the correct usage of washers. | installing threaded fasteners in the appliance. | identify left and right hand threads. Read service menual and parts manual for application of left hand threads. | Observe safety rules and regulations. Listen to film. Watch demonstration of effects of shorted, ungrounded appliance. | Installing cover plates on small appliance according to service manual procedures. |
| SUGGESTED INSTRUCTIONAL MATERIALS | Various fastening devices. | Assortment of various washers. | Handtools: wrenches nuteriors screwdrivers strewdrivers | Parts manuals. Service manuals. Left hand threads. Right hand threads. | Defective appliance. V.O.M. Textbooks: Now to Repair Electrical Appliances, Book 2 (1964), H. P. Nanly, Fraderick J. Drake & Co. Rublishers, p. 265. How to Repair Major Appliances, Jack Derr, Howard M. Sams & Co. Inc., (1965), p. 95. Film: "The Factory: How a Product is Nede," borrow from Encyclopedia Britannica. | Handtools. Small heating element appliances. Service manuels. |
| SUGESTED TEACHING METHODS | Demonstration. Practical work. | Demonstration. Display. | Demonstration. Practical work. | Demonstration. Fractical work. | Demonstration. Lecture. Film. | Demonstration. Practical work. |
| AREA OF HUMAN REQUIREMENT | Recognizing the various types of fastening devices: (a) Threaded fasteners: boit & nut cap & screw machine screw set screw set screw sheat matel & self-tapping screw study boit (b) Keys, rivors & springs (c) Cotter pins & shear pins (d) Retaining rings | Recognizing the various types and uses of washers. | Applying the proper method of installing threaded fastaners. | Recognizing the difference between right and laft hand threads. | Applying the proper safety preceutions: (a) Wearing safety shoes with non- conducting soles. (b) Removing jeweiry & items of clothing with metal fasteners. (c) Disconnecting the appliance before attempting servicing. (d) Properly greounding appliance. | Explaining the importance of observing recommended procedures when tightening down plates, covers, and flanges. |

Task No. 5 (continued)

ERIC Fruit feet Provided by ERIC

| SUGGESTED EVALUATION PROCEDURES | Operational check after work Is completed. | Inspect the properly wired appilance. | Observe the typing of the underwriters knot. | Inspect the repaired coil. | Make operational check of the appliance. |
|--------------------------------------|---|---|--|---|--|
| STUDENT ACTIVITIES | Installing heating elements in the small appliance with the appropriate tools. | Inspecting the appliance to determine broken or demaged wiring. Replacing wiring according to specifications. | Students will tie en underwriters knot when needed in the replacement of a plug or wire on the appliance. | Students will repair open-type coil with solderless connections as outlined in the reference menual. | epplience. |
| SUGGESTED INSTRUCTIONAL MATERIALS | Heating elements. Handroots. Insulators. Small appliances. Small appliances. Appliances. Jack Darr, Howard W. Sams al. Do., Inc. (1965), p. 85. Electrical Appliance Servicing. William H. Crouse, 1.C.S., Scranton, Pa., Serial 6729A (1965), p. 18. | Hendtools. Service and appliance cord. Appliance. Tecthook: Electrical Appliance. Servicing, WITTIER H. Grouse, T.C.S., Scranton, Ps. Seriel 6729A (1963), pp. 8, 18. | Wire. Plug. Textbook: Electrical Appliance Servicing, William H. Grouse, T.C.S., Scranton, Pa. Serial 6729A (1965), p. 15. | Open-type coll. Solderless connections. Crimping tools. Textbook: Electrical Appliance Servicing, William H. Grouse, T.C.S., Scramfon, Ps., Seriel 6729A (1965), p. 18. | Appliances. Ord and plug. Handtools. Tertbook: How to Repair Small Appliances, Jack Darr, Howard W. Sams & Co., inc., (1965), p. 65. |
| SUGGESTED TEACHING METHODS | Practical work. | Practical work. | Practical work. | Practical work. | Practical work. |
| AREA OF . HUMAN REQUIREP "NT | Replacing heating elements and insulators with the appropriate tools. | Replacing broken or damaged wires with the appropriate tools. | Tying underwriters knot when replacing a plug. | Repairing breaks in open-type coils with solderless connections using crimping pliers. | Replacing the defective cord and/or plug. |

TASK NO. 6: TESTING THE OPERATIONS OF THE REPAIRED SMALL HEATING ELEMENT APPLIANCES

| SUCCESTED EV'LUATION PROCECURES | Quiz on identification of faulty components as defected with instruments. | Quiz on Chin's Law. | Quiz on conductors and insulators. | Quiz on film. | Quiz on identification of meters and their function. | Check meters for correct calibration. |
|--------------------------------------|---|--|--|---|--|--|
| SUGGESTED STUDENT ACTIVITIES | Reading meters connected to components to determine their condition. Hooking up the V.D.M. to components. | Computing Ohm's Law problems. | Students will be able to determine conductors: Type. Size. Insuletion. Students will recognize insulators of different types. | Listen to film. | Daterwine test to be made and select a mater accordingly. | Calibrate meters according to the manual peculiar to the mater. |
| SUGGESTED INSTRUCTIONAL MATEPIALS | Heating element appliances. V.O.M. Continuity testar. Textbook: How to Repair Electrical Appliances, Book Z (1964), H.P. Menly, Frederick J. Orake & Co., Publishers, Chapter 16. | Quiz on Oter's Lev. | Assorted insulators end types of wire. Taxtbook: How to Repair Small Appliances, Jack Derr, Howard W. Sems & Co., Inc., (1965), p. 65. | Film: "Nature of Heat," rent from Correct Films, Wilmette, 111. | Wolfmeter. Augmenter. Continuity tester. V.O.H. Textbooks: How to Repair Electrical Appliances, Book Z (1964), H.P. Hanly, Fraderick J. Orake & Co., Rublishers, p. 264. Simplified Electrical Appliance Servicing, Arthur Stephons, Simpson Electric Company (1966), Chicago, 111. pp. 2-3. | Manuais. Manuais. Textbook: Simplified Electrical Appliance Servicing, Arthur Stephons, Simpson Electric Company (1966), Chicago, 111. |
| SUGGESTED TEACHING METHOCS | Demonstration. Practical work. | Practical work. | Demonstration. Practical work. | | Demonstration. | Demonstration. Practical work. |
| AREA OF MUMAN REQUIPEMENT | interpreting meter readings to determine the condition of the components. | Computing Ohmis Law to determine amperage, voltage and resistance. | Explaining the function of conductors and insulators. | Explaining the various methods of heat transfer: (a) Cond ction (b) Connection (c) Rediation | Selecting the appropriate alectrical maters for the job to be done: (a) Voltmaters (b) Ampmater or amp-probe (c) Continuity tester (d) Volt-Ohm mater (y.O.K. | Determining the correct method of Inspecting, checking, calibrating electrical maters to known standards. |

Task No. 6 (continued)

ERIC Full text Provided by ERIC

| SUGGESTED EVALUATION PROCEDURES | observe the connection of meters in a circuit by students. | Check students ability to localize defective components with electrical maters. | ding to Test student performance in connecting electrical maters. | Check resistance and voltage mesurements against known values. | Observe the storage and mair .enence of electrical meters. |
|--|--|---|--|--|--|
| SUGGESTED STUDENT ACTIVITIES | Connect maters in a circuit correctly. | Test components to localize the mainfunction in the applience. | Connect maters in a circuit according to manuel. | Mesuring the voltage and resistance in the appliance with a V.O.M. Reading mater resilings on job sheet. | Meinteining meters in proper working condition. |
| SUGGESTED · INSTRUCTIONAL MATERIALS | Appliances. V.O.M. Confinulty tester. Confinulty tester. Textbook: Simplified Electrical Appliance Servicing, Arthur Stephone, Simpson Electric Campany (1966), Chicago, Ill., p. 273. | Efectrical meters. V.O.M. Apparters. Confinuity feater. Switches, controls, heating elements. Texthesis: New to Repair Small Appliances, Jeck Darr, Howard W. Small & Co., Inc. (1963), Chapter 2. Slapilitied Electrical Appliance Sarviging, Arfhur Shaphons, Slapinian Efectric Company (1966), Chionge, Ill. | Appliances. Electrical meters. V.O.II. Appliance Stricing, Arthur Steplone, Simpson Electric Company (1966), Chicago, III. | Appliances (small). V.O.III.*3. Textbooks: Now to Repair Electrical Appliances. Book Z (1944) H. P. Manly, Frederick J. Orake & Oo., Publishers, p. 270-271. Simplified Electrical Appliance Sarvicing, Arthur Stephons, Simpson Electric Company (1966), Chicago, 111. | Textbooks: How to Repair Major Appliances, Erneaf Tricomi, Howerd M. Same & Co. Inc. (1966), Chapter I. Sing Iffled Electrical Appliance Servicing, Arthur Stephone, Simpson Electric Company (1966), Chicago, III., |
| SUGGESTED TEACHING METHODS | Demonstration. Practical work. | Practical work. | Demonstration. Practical work. | Demonstration. Practical work. | Demonstration. Practical work. |
| AREA OF HUMAN REQUIREMENT | Recognizing the importance of proper connections when using appropriate electrical maters. | Inspecting the electrical components with the appropriate electrical maters to locate the defective section. | Consecting the electrical maters in the proper manner. | Determining voitage and resistance in the appliance with a voit-Ohm meter: | Applying the proper care, maintenance and storage of electrical maters. |

| SUGGESTED EVALUATION PROCEDURES | Written quiz on reference material. Write an order for a replacement part. Observe the proper use of special tools. | Observe the correct application of electrical maters. | Quiz on "name that part." | Observe the correct usage of tools. | Inspection of care, maintenance, and storage of tools. | Observe students at work. | Observe students. | Observe the correct usage of pliers. |
|--|--|---|---|--|--|---|--|--|
| SUGGESTED STUDENT ACTIVITIES | Reading drawings, schamatics, specifications. Identifying components from drawings. Identifying special tools. Writing the specifications for defective parts. | Impacting the appliance with electrical markers to determine grounds. | Locating components of the appliance from the service menual. Identifying parts by name with aid of service menual. | Examining different types of: Screwdrivers. Wrenches. Wretches. Writerivers. Wetfrivers. Using the tools for the purpose for which they were infended. | Maintaining tools in a working condition. | Holding, handling, and using tools correctly. | Tuisting, puiling, and pressing with pilers. | Remove nut from boilt with pilers and observe demage. |
| SUGGESTED INSTRUCTIONAL MATERIALS STUD | Menufacturer's service manual. Parts Lists. Tentheches Major Applicance Servicing, Parcy I. Bredwell, Jr. McGra-Hill Back Co., 1979, New York, N.Y., p. 211. Her to Repair Samil Appliance. Jack Darr, Henerd M. Same & Co., Inc. p. 113. Electrical Appliance Servicing, William W. Crouse, 1.C.S., Scranfon, Pa., Serial 6729A (1965), pp. 1-32. | Appliance, small. V.O.M. | Service memeis. Aprilances. | Screedrivers. Filers. Wrenches. Nurferivers. Teathook: How to Resir Small Appliances, Jack Darr, Howard W. Same & Co., Inc. (1965), p. 115. | "ABC's of Hendtools," published by General Hotors. | Assorted hand wrenches. | Pilers. | Pilers. Nuts and boits. |
| SUCCESTED TEACHING METHODS | Demonstration. Lecture. Practical work. | Demostration. Practical wark. | Describe. Practical work. | Demonstration. Practical work. | Descritation. Practical work. | Demonstration. Practical work. | Description. | Demonstration. |
| AREA OF Haman Requirement | Interpreting drawings, specifications, manufacturer's catalogues, service manuals, schematics and handbooks to determine: (a) Installation precedures & tachniques. (b) Service procedures. (c) Type, function & rating of defective pert. (d) Electrical supplies. (e) Special service teols. (f) Electrical code. | Applying the proper mathods of checking for electrical grounds. | Recognizing the various perts of the appliance. | Selecting the proper type and size of: (a) Screedrivers (b) Pliers (c) Wrenches (d) Outters (e) Nutdrivers | Applying the proper care, maintenance and storage of tools | Recognizing the proper methods of holding wrenches. | Applying mathods of holding pliers for pulling, pressing and twisting. | Recognizing the results of using pilers for removing nuts and bolts. |

1 2

Task No. 7 (continued)

| SUGGESTED EVALUATION PROCEDURES | Observe students cutting correctly. | Observe students stripping wire. | Observe the use of fastening devices. Quiz on the uses of different fastening devices. | Observe the proper application of washers. | Observe the correct usage of tools as to not damage threaded festeners. | Test students ability to read service menual to determine location of left hand threads. |
|------------------------------------|---|--|---|--|---|--|
| STUDENT ACTIVITIES | Out wire with diagonal cutters. | Namoving the insulation from wires with strippers. | Morking with various fastening devices to determine the characteristics of each. | Determining the correct usings of washe'rs. | Installing threaded feateners in the appliance. | identify right and left hand threads. Read service menuel and parts menuel for application of left hand threads. |
| INSTRUCTIONAL MATERIALS | Outters. | Mire strippers. Mire. Testbook: Reliable Electrical Obsequiose Technology Handback, Srd ediffica. MASA SF-5002, George C. Marshell Space Filght Center, Muntsville, Alabame, Dec. 1963, James A. Gey, Jr. | Verlous factoning devices. | Assertment of verious weekers. | Hendtools: Wrenches Wurderlvers Scrawdrivers Threaded fastwners | Parts manuals. Service manuals. Left hand threads. Right hand threads. |
| TEACHING METHODS | Demonstration. Practical work. | Demonstration. Practical work. | Demonstration. Practical work. | Demonstration. Oisplay. | Demonstration. Practical work. | Demonstration. Practical work. |
| HUMAN REQUIREMENT | Appiving the proper procedures for cutting with diagonal cutters. | Determining the proper method os stripping wire. | Recognizing the various types of fastening devices: (a) Threade fasteners boit and nut cap screw set screw shear matal & self-tapping screw shear matal & self-tapping screw shear matal & self-tapping screw (b) Nays, rivots & springs (c) Oxiter pins & shear pins (d) Revaining rings. | Recognizing the various types and uses of washers. | Applying the proper methods of Installing threaded fasteners. | Recognizing the difference between right and left hand threads. |

fask No. 7 (continued)

ERIC Provided by ERIC

| SUGGESTED EVALUATION PROCEDURES | Quiz on film. Quiz on safety rules and regulations. | Observe the Installation procedures. | Check of appliance for correct lubrication. | Examine cleened parts. Test with V.O.M. (resistance). | Oveck to see that all components are properly cleaned. | inspect the appliance to observe the correct usage of tools, correct assembly and functioning item. | |
|---------------------------------|---|--|---|--|---|---|--|
| STUDENT ACTIVITIES | Observe safety rules and regulations. Listen to film. Match demonstration of effects of shorted, ungrounded appliance. | Installing cover plates on small appliances according to service manual procedures. | Students apply the specified lubricants to appliance linkage according to specifications. | Cleaning contacts to insure proper confact. | Cleaning components to insure proper functioning in the appliance. | installing cover plates on the appliance to resorre original condition. | |
| SUGGESTEU SAUCTIONAL MATERIALS | Defective appliance. V.O.M. Younger Textbooks: How to Repair Electrical Appliances, Book 2 (1964), H. P. Henly, Frederick J. Grains & Co., Fuel ishers, p. 265. Hear to Repair Small Appliance, Jack Derr, Houard W. Sms & Co., Inc. (1966), p. 95. Film: "The Factory: How a Product is Neds," borrow from Encyclopedia Britamatica. | Handbols. Smil harting element appliance. Service memols. | Service menuels. Lubricants - high temperature. Appliances. | Heating elements. Abrasive cloth. Service manual. | Small brushs. Components and controls. Terthook: How to Repair Small Appliance, Jack Derr, Howard W. Small Co., Inc. (1965), p. 95. | Handtools. Ovver plates. Service menuals. | |
| SUGGESTED TEACHING METHODS | Demonstration. Lecture. Film. | Demonstration. Practical work. | Practical work. | Demonstration. Practical work. | Practical work. | Demonstration. Practical work. | |
| AREA OF HJBMM REQUIREMENT | Applying the proper safety precautions: (a) Wearing safety shoes with non-conducting soles. (b) Removing jewiery & Items of clothing with matel festeners. (c) Providing work situations where moisture is present. (d) Disconnecting the appliance before attempting servicing. (e) Properly grounding appliance. | Explaining the importance of observing recommended procedures when flightening down plates, covers, and flanges. | Applying lubricant on linkage and levers of the appliance. | Dressing contacts on plug-in type elements . with abrasive cloth. | Cleaning all dirty components with a small brush. | Replacing the fasteners and cover plates with the appropriate tools. | |

TASK NO. 8: RETESTING THE ASSENBLED SMALL HEATING ELEMENT APPLIANCE

| SUGGESTED EVALUATION PROCEDURES | Quiz of check points on the appliance from the service menual. | Observe the performance of the appliance. | Listen for misinformetion. |
|--|---|--|--|
| SUCCESTED STUDENT ACTIVITIES | Reding service manuels and locating on the appliance check points. | Operate the eppliance under normal working conditions. | Students lecture to their group, emplaining the operation of an appliance. |
| SUGGESTEO INSTRUCTIONAL MATERIALS | Appliances. Service menuels. | Appliance. Service menuals. | An appliance: Toaster Coffee maler Non heater |
| SUGGESTED TEACHING METHICS | Demonstration. Lecture. | Practical work. | Describer Lecture. Practical work. |
| area of Human Requirement | interpreting instructions from the service manual for check points. | Operating the appliance to determine performance. | Explaining the basic operation of the appliance. |

TASK NO. 9: OBSERVING THE SYMPTOMS TO DETERMINE THE DEFECT(S) IN SMALL MOTOR DRIVEN APPLIANCES

| APEA OF HUMAN PEQUIREMENT | SUGGESTED TEACHING METHODS | SUGGESTED INSTRUCTIONAL WATERIALS . | SUGESTED STUDENT ACTIVITIES | SUGGESTED EVALUATION PROCEDURES |
|--|--|---|---|---|
| Interpreting the customer's complaint concerning the relfunction of the appliance. | Lecture/participation by student. Skit (students). | Oustomers with appliance: Ooffee maker Room heater Toester | Students act out skit with customer in deciding from his complaint the mainfunction of the appliance. List possible failure causes. | Cross-check complaint list and possible causes. |
| Writing the maifunctions of the appliance on a service ticket. | Practical work. | Service tickets. Tacthook: Electrical Appliance Servicing, William H. Crosse, T.C.S., Scranton, P., Serial 6729A (1965), p. 28. | Fill out service record ticket. | Check that ell entries are correct. |
| Explaining the basic operation of the appliance. | Damonstration. Film. | Out-evey" overlays. Film: "Electromagnets." | Observe fills and desonstration. | Written explanation of appliance operation. |
| Visually inspecting for obvious defects in the cord and plug. | Demonstration. Practical work. | Faulty cord and plug. Good cord and plug. | Determine a defect in the cord and ping from observation. | Test students ability to recognize a defect in cord and plug and to recognize a good one. |
| Visually inspecting for obvious defects in the appliance. | Demonstration. Practical work. | Appliance with maifunction. Broken linkage, etc. | Examining appliances to determine maitunction. | Ask students to identify faulty area or component. |
| Operating the appliance in order to observe the maifunction. | Practical work. | Faulty appliances. | Fing the appliance into a convenience reception. Here maisuration and compare with customer complete. | Observe student work. |

TASK NO. 10: DISASSEMBLING SMALL ELECTRIC MOTOR APPLIANCES FOR TESTING AND REPAIRING

| SUGGESTED EVALUATION PROCEDURES | Written quiz on reference material. Write an order for a replacement part. Observe the proper use of special tools. | Observe the correct usage of tools. | Inspection of care, maintenance, and storage of tools. | Observe students at work. | Student demonstrates his ability to secure work to prevent accidents and facilitate repairs. | Observe students. | Observe the correct usage of pillers. |
|-----------------------------------|--|--|---|---|--|---|--|
| SUGGESTED STUDENT ACTIVITIES | Reading drawings, schematics, specifications. Identifying components from drawings. Identifying special tools. Writing the specifications for defective parts. | Examining different types of: a. Screwdrivers b. Pilers. c. Wrenches. d. Mardrivers. Using the tools for the purpose for which they were intended. | . Maintaining tools in a working condition. | Holding, handling, and using tools correctly. | Securing work for safe operation. | Tuisting, pulling, and pressing with pilers. | Name out from bolt with pillers and observe damage. |
| SUGGESTED INSTRUCTIONAL MATERIALS | Manufacturer's service menual. Parts Lists. Tertbooks: Major Appliance Servicing, Fercy T. Brockwell, Jr. McGrae-Hill Buck Co., 1958, New York: N.Y., p. 211. How to Mapair Smill Appliances, Jack Darr, Howerd W. T. to Co., Inc. (1965), p. 113. Electrical Appliance Servicing, William M. Crewse, 1.C.S., Screnton, Fe., Serial 6729A (1965), p. 1-32. | Screed ivers. Nites. Notes. Martis ivers. Terfbook: How to Repair Electrical Appliances, Book & (1964), H. F. Manly, Frederick J. Drake & Co., Publishers, p. 113. | "AEC's of Handtools," published by General Hotors. | Assorted hand wranches. | Holding devices: clamps vices | P! lers . | Pilors. Nurts and boits. |
| SUGGESTED TEACHING METHODS | Demonstration. Lacture. Practical work. | Demonstration. Practical wark. | Descritation. Practical work. | Description. Practical work. | Describeration. Practical work. | Demonstration. | Demonstration. |
| AVEA OF HJMAN REQUIREMENT | Interpreting drawings, specifications, manufacturer's catalogues, service manuals, schematics and handbooks to detarmine: (a) installation procedures & techniques. (b) Service procedures. (c) Type, function & rating of defective part. (d) Electrical supplies. (e) Special service tools. (f) Electrical code. | Selecting the proper type and Size of: (a) Screwdrivers (b) Pliers (d) Wrenches (d) Cutt ers (e) Nutdrivers | Applying the proper cere, melintenance, and storage of tools. | Recognizing the proper methods of holding wrenches. | Applying the proper methods of holding work. | Applying methods of holding pilers for pulling, pressing, and twisting. | Recognizing the results of using pilers for removing nuts and boits. |

Tesk No. 10 (continued)

ERIC

Full fext Provided by ERIC

| SUGGESTED EVALUATION: PROCEDURES | Observe students correctly strip wire. | Observe students cutting correctly. | Observe the use of festening devices. Quiz on the uses of different fastening devices. | Observe the proper application of washers. | Observe the correct usage of tools as no not damage threaded festeners. | Test students ability to read service menual to determine location of left hand threads. |
|--------------------------------------|---|---|---|---|---|--|
| SUGGESTED STUDENT ACTIVITIES | Resoving the insulation from virus with strippers. | Cutting wire with diagonal cutters. | Norking with various fastening devices to defend the characteristics of each. | Determine the correct usage of washers. | Install threaded fasterners in the appliance. | identify left and right hand threads. Read service menual and parts menual for application of left hand threads. |
| SUGGESTED INSTRUCTIONAL MATERIALS | Mire strippers. Wire Textbook: Reliable Electrical Connections, Technology Handbook, Srd edition. MSA SP-5002, George C. Marshell Space Flight Center, Huntsville, Alabame, Dec. 1965, James A. Gey, Jr. | Suffer. | Various fastening devices. | Assortant of various washers. | Handtoels: Mrdrivers Scredrivers Threeded fasteners | Perts menuel. Service menuels. Left hand threads. Right hand threads. |
| SUGGESTED TEACHING METHODS | Demonstration. Practical work. | Described of Practical work. | Damonstration. Practical work. | Demonstration. Display. | Demonstration. Practical work. | Demonstration. Practical work. |
| AREA OF HJAVAN REQUIREMENT | Determining the proper methods of stripping wire. | Applying the proper procedures for cutting with diagonal cutters. | Recognizing the various types of fastening devices: (a) Threaded fasteners Boit and nut Cap screw Facting screw Set screw Sheat matel & self-tapping screw Stud boit (b) tays, rivota & aprings (c) Cotter pins & shear pins (d) Retaining rings | Recognizing the various types and sizes of washers. | . Applying the proper methods of removing threeded festeners. | Recognizing the difference between right and left hand threads. |

Task No. 10 (continued)

| SUGGESTEU EVALUATION PROCEDURES | Quiz on fils. Quiz on safety rules and regulations. | Check to see the soldering gun and tip to fit the job. | inspect the tinned soldering tip. | Observe the correct solder used on copper wire. | Observe the correct usage of flux depending on the job. | Examine correctly soldered joints. Look for "cold" joints. Check with V.O.M. (resistence). |
|--------------------------------------|--|--|--|---|---|---|
| SUGGESTED STUDENT ACTIVITIES | Observe safety rules and regulations. Listen to film. Wetch demonstration of affects of shorted, ungrounded appliance. | Examining seldering gans and Irons to defending the best tip for the particular job. | Students will tin the soldering gun tip to insure the transmission of hest. | Determining the solder for capper uits by virtue of the core, rosin. | Selecting the proper fulx for appliance wiring. | Students will solder wires correctly. |
| SUGGESTED INSTRUCTIONAL MATERIALS | Defective appliance. V.O.M. Y.O.M. Textbooks: How to Repair Efactrical Agailances, Book 2 (1964), H. P. Manly, Frederick J. Drake & Co., Publishers, p. 260. How to Repair Small Appliances, Jack Darr, Howerd W. Same & Co., (1964), p. 48. Files: "The Factory! Hew a Product is Nede," perrow from Encyclopedia Britanelce. | Seldering gund. Tip essertumit. Textbook: [bi]:able_Electrical Connections, Technology Handbook, STG GETTON. NASA ST-2002, George C. Marchell, Space FITGA Canter, Nuctsville, Aisbean, Dac. 1963, James A. Gay, Jr. | Scieering gune. Solder (roein core). Flux. Steel wooi. | Copper wire: Solida Stranded Solidering gun. Rosin core solder. Solidering paste. | Soldering flux. | Overlays of correct soldering methods. V.O.M. Textbook: Electrical Appliance Servicing, William H. Grouss, T.C.S., Scranfon, Pa., Serial 6729A (1965), p. 12. |
| SUGGESTED TEACHING METHODS | Description. Lectus e. Flim. | Describer work. | Denomatration. Practical work. | Demonstration. Lecture. | Describer. Lecture. | Demonstration. |
| AREA OF HJWAN REQUIREMENT | Applying the proper safety precautions: (a) Wearing safety shoes with non- conducting soles. (b) Removing jewelry & Items of clothing with marial featners. (c) Avoiding work situations where moisture is present. (d) Disconnecting the appliance before attempting servicing. (e) Properly grounding appliance. | Selecting the proper types and sizes and tip soldering gun. | Recognizing the importance of tinning the fip of the soldering Iron. | Deferalning the correct composition of solders to be used on the appliance. | Recognizing the importance and purposes of flux when soldering. | Applying the proper mathods of transferring heat to work and applying solder to the joint. |

| | , |
|--|---|
| | 1 |
| | 1 |
| | |
| | |
| | • |
| | ž |
| | 1 |
| | ٠ |

| AREA DF HJWW REQUIREMENT | SUGGESTED TEACHING METHODS | SUGGESTED INSTRUCTIONAL MATERIALS | SUGGESTED STUDENT ACTIVITIES | SUGGESTED EVALUATION PROCEDURES |
|--|-----------------------------------|---|--|---|
| Namoving festeners and cover niziting of the appliance with the appropriate fools. | Demonstration. Practical work. | Service manuels. Twitbook: How to Repair Small Appliances, Jack Darr, Howard W. Sems & Do., Inc. (1965), Chapter I. | Students will correctly, according to the reference, remove the cover plates from the appliance. | Observe students using the service manuals. |
| Removing soldered connections with a soldering iron. | Omonstration. Practical work. | Soldering gun. Soldering aid. Soldered circuit. | Students vill remove soldered joints with a soldering gun and soldering sid. | Observe the correct procedures used in removing a soldered joint. |

| AREA OF HUMAN REQUIREMENT | SUGGESTED TEACHING METHODS | SUGGESTED INSTRUCTIONAL MATERIALS | SUGGESTED STUDENT ACTIVITIES | SUGGESTED EVALUATION PROCEDURES |
|--|---|--|--|---|
| Interpreting drawings, specifications, manufacturer's catalogues, service manuals, schematics and handbooks to determine: (a) Installation procedures & techniques. (b) Service procedures. (c) Type, function and rating of defertive per. (d) Electrical supplies. (e) Special service tools. (f) Electrical code. | Description. Lecture. Practical work. | Manufacturer's service manual. Parts Lists. Textbooks: Major Appliance Servicing. Percy T. Brockwell, Jr., McGraw-Hill Book Do., 1958, New York, M.Y. How to Repelr Small Appliances, Jack Derr, Howard W. Sams & Do., Inc. (1965), p. 113. Electrical Appliance Servicing, William H. Grouse, T.C.S., Scranton, Pe., Serial 6729A (1965), pp. 1-32. | Reading drawings, schematics, specifications, and catalogues. Identifying components from drawings. Identifying special tools. Writing the specification for defective parts. | Written quiz on reference meterial. Write an order for a replacement part. Observe the proper use of special tools. |
| Reading the manufacturer's service reference chart for possible causes of the trouble. | Independent reading. | Service reference Charts for various appliances. | Reading trouble shooting chart to determine cause of fallure of the appliance. | Quiz on service reference charts to check reading comprehension of students. |
| Computing Ohm's Law to defermine amperage, voitage and resistence. | Practical work. | (siz es Ohn's Lau. | View film. Computing Ohm's Law problems. | Quiz on Ohm's Law. |
| Explaining the electron theory of current flow in the appliance. | FI inc. | Films: "Introduction to Electricity," row from Cornet Films, Wilmette,! "Acste Electricity - The Electron Theory," Borrow from Encyclopedia Britannice (5 min.). | View #1 is. | Quiz on flim. |
| Applying the proper method of checking for electrics! grounds. | Demonstration. Prectical work. | Appliance (ameli). | inspecting the appliance with electrical maters to determine grounds. | Observe the correct application of electrical meters. |
| Applying the proper procedure for tracing electrical circuits. | Demonstration. Lecture. Practical work. | Appllances. Schematics. V.O.M. | Students listen to and follow lecture, demonstration. Students will identify components in the appliance efter locating them on a schematic. | Ask students to identify components on the appliance from a schematic. |
| Applying the proper safety precautions: (a) Wearing sefety shoes with non- conducting soles. (b) Removing jeweiry & items of clothing with matal festerars. (c) Avoiding work situations where moisture is present. (d) Disconnecting the appliance before attempting servicing. (e) Properly grounding appliance. | Demonstration. Lacture. Film. | Defective appliance. V.O.M. V.O.M. Tertbooks: How to Repair Electrical Appliances, Book 2 (1964), H. P. Manly, Frederick J. Drake & Co., Publishers, p. 265. How to Repair Small Appliances, Jack Darr, Howard W. Small & Co., Inc. (1965), p. 95. | Students observe safety rules and regulations. Listen to film on safety. watch demonstration of effects of shorted, ungrounded appillance. | Quiz on film. Quiz on safety ruies end regulations. |

| SUGGESTED STUDENT ACTIVITIES EVALUATION PROCEDURES | to determine Ask students to identify faulty area or component. | Testing the components of appliances with Observe students ability to determine defective components. | Deserve students ability to determine uppliance and test each defective component through testing. | Students will connect meters in a circuit Test on student performence in connecting according to menual. |
|--|--|---|---|--|
| SUGGESTED SUGGESTED STUDENT AC | Appliance with maifunction. Examining appliances to determine section. | Continuity tester. V.O.M. Small hearting element. Appliance - good and defective switchs. | Service manuals. Appliances. V.O.M. Vol.M. Assorbed tests. | Students will connect Electrical maters: |
| SUGGESTED TEACHING METHODS | Demonstration. Practical work. | Demonstration. Practical work. | Practical work. | Descricel work. |
| AREA OF HJAAN REÇUIREMENT | Visually inspecting for obvious defects in the appliance. | inspecting the appliance for facts with a continuity tester or volt-Cha meter. | Ellminating the possible cause of defects until the particular defective section of the appliance is found. | Connecting electrical maters in the proper manner. |

| SUGGESTED EVALUATION PROCEDURES | Written quiz on reference material. Write an order for a replacement part. Observe the proper use of special tools. | Quiz on identification of faulty components as detected with instruments. | Quiz on Ohm's Law. | Quiz on film. | Cheerve the correct application of electrical maters. | Ask students to identify components on the appliance from a schematic. | Check maters for correct calibration. |
|-----------------------------------|---|--|--|---|---|--|---|
| SUGGESTED STUDENT ACTIVITIES | Reading drawings, schematics, specifications, catalogues. Identifying components from drawing. Identifying special tools. Writing the specifications for defective parts. | Reading meters connected to components to defermine their location. | Computing Chais Law problems. | Listening to file. | Inspect the appliances with electrical maters to defermine grounds. | Listen to and follow lecture, demonstration. Identify components in the appliances after locating them on a schematic. | Calibrating meters according to the menual paculiar to the meter. |
| SUGGESTED INSTRUCTIONAL MATERIALS | Manufacturer's service manual. Parts Lists. Tentbooks: Major Appliance Servicing. Percy T. Brockell, Jr., McGrar-Hill Book Cb., 1958, New York, N.Y., p. 211. How to Repair Small Appliance, Jack Darr, Howard W. Small Appliance, Jack Darr, Howard W. Small About the (1965) p. 113. Electrical Appliance Servicing, William H. Grouse, T.C.S., Scranfon, Pe.; Serial 6729A (1965), pp. 1-32. | Meeting appliance element. V.O.M. Ourinalty tester. Textbook: Her To Repole Electrical Appliances, Book 2 (1964), H. P. Hanly, Frederick J. Draho & Co., Publishers, Chapter 16. | Quiz on Uma's Law. | Film: "Magnerism," 16 min., borrow from Encyclopedia Britannica. | Appliance, small. V.O.M. | Appliance. Schamptics. V.O.M. | Merers. Menuels. Textbook: Simplified Electrical Appliance Servicing, Arthur Stephons, Simpson Electric Company (1966), Chicago, 111. |
| SUGGESTED TEACHING METHODS | Damonstration. Lacture. Practical work. | -Demonstration. Practical work. | Practical work. | ë E | Demonstration. Practical work. | Demonstration. Lecture. Practical work. | Demonstration. Practical work. |
| AREA OF HJAAN REQUIREMENT | Interpreting drawings, specifications, manuals, schematics and handbooks to determine: (a) Installation procedures & tachniques. (b) Service procedures. (c) Type, function & rating of defective part. (d) Electrical supplies. (e) Special service tools. (f) Electrical code. | interpreting the mater readings to determine the condition of components. | Computing Chm's Law to determine amperage, voltage and resistance. | Explaining the electron theory of current flow in the appliance. | Applying the proper procedures for checking for electrical grounds. | Applying the proper procedures for tracing electrical circuits. | Determining the correct methods of 'Inpsecting, checking, calibrating electrical meters to known standards. |

•

.,

Task No. 12 (confinued)

ERIC

| SUGGESTED EVALUATION PROCEDURES | Observe the connection of eaters in a circuit by students. | Quiz on identification of meters and thair function. | Observe the storage and maintenance of electrical maters. | Quiz on film, Quiz on safety rules and regulations. | Test students ability to recognize a defect in a cord or plug and to recognize a good one. |
|--------------------------------------|--|--|---|--|--|
| SUGGESTED STUDENT ACTIVITIES | Connecting severs in a circuit correctly. Or in | Deforming test to be made and solect a grant accordingly. | Condition. | Students vill observe sefety rules and Quiragulations. Listen to fillin on safety. Watch desonstration of effects of shorted, ungrounded appliance. | Defermining a defect in the cord and Taplug from observation. |
| SUGGESTED Instructional materials | Appilance. V.O.M. Omrimulty tester. Textbooks: How to Repair Electrical Appilances, Book 2 (1961), H. P. Heally, Frederick J. Draise & Co., Publishers, 273. Simplified Edectrical Appilance Servicing, Arthur Stephons, Simpen Electric Company (1966), Chicage, 111. | Netherlands: Appendix to the second of the s | Merters. Merters. Tecrhoods: Now to Repair Majer Apellances, Errest Tricent, Howerd W. Sens & Co., Inc. (1963), Chapter I. Simplified Electrical Appliance Servicing, Arthur Stephens, Simpson Electric Company (1966), Chicago, III. p. 2-3. | Defective appliance. V.J.M. Textbooks: How to Repair Electrical Appliances, Book 2 (1964), H. P. Henly, Frederick J. Drake & Co., P. History, Prederick J. Drake & Co., Rev to Repair Small Appliances, Jack Chrr, Howard W. Same & Co., Inc. (1963), p. 95. Film: "The Factory: How a Product is Nade," horrow from Encyclopedia Britannica. | Faulty cord and plug. Good cord and plug. |
| SUCHESTED TEACHING NETHODS | Demonstration. Practicul work. | Demonstration. | Demochation. Precticul work. | Description. Lecture. Film. | Demonstration. Practical cord. |
| изман мери Нам | Recognizing the importance of proper connection of appropriate electrical maters. | Selecting the appropriate electrical meters for the job to be done: (a) Voltameters (b) Augmenter or mar-probe (c) Continuity tester (d) Voit-Otte meter (V.O.M.) | Applying the proper care, maintenance, and storage of electrical maters. | Applying the proper sefety precentions: (a) Meaning sefety shoes with non- conducting sedes. (b) Nemoving jessiny & Itams of clothing with sefel festeners. (c) Avoiding work situations where solsture is present. (d) Disconnecting the appliance before attempting servicing. (e) Properly grounding appliance. | Visually inspecting for obvious defects in the cord and plug on the appliance. |

| | | | | | , | | |
|--------------------------------------|--|---|--|---|---|---|--|
| SUGGESTED EVALUATION PROCEDURES | Performance test in connecting electrical maters. | Observe students ability to recognize a defective switch. | Observe students ability to locate defective electrical connections with meters. | Observe students at work. | Observe students ability to locate defective components with electrical maters. | Oback to see that all components are properly cleaned. | |
| SUGGESTED STUDENT ACTIVITIES | Connecting maters in a circuit according to manual. | Testing switches with meters and testers to determine their condition. | Testing connections for defects with meters. | Determining good and defective accessories from an assorbant. | Testing components to localize the majfunction in the appliance. | Cleaning components to insure proper functioning in the appliance. | |
| SUGGESTED INSTRUCTIONAL MATERIALS | Electrical meters: V.O.W. Amenter and probe Continuity tester. Testbook: Simplified Electrical Appliance Servicing, Arthur Stuphons, Simpon Electric Company (1966), Chicago, 111. | Continuity tester. Y.O.M. Small hesting element appliance. Good and defective switch. | Continuity tester. V.O.M. Small appliances. Yesthook: Staplified Electrical Appliance Servicing, Arthur Staphons, Simpson Electric Company (1966), Chicago, 111. | Service menuals. Y.O.M. Good and defective accessories. | Switches, controls, heating elements. Youngeries Youngeries Continuity tester Textbooks: New to Negair Small Appliance: New to Negair Small Appliance: (1963), Oneyor 4. Small Go., Inc. (1963), Oneyor 4. Small Go., Inc. (1963), Oneyor 4. Small Marker Stephone, Simpson Electric Company (1966), Onicage, 111. | Small brush. Components and controls. Terthook: How to Repair Small Appliances, Jack Derr, Howard L. Sam & Co., Inc. (1966), p. 95. | |
| SUGGESTED TEACHING METHODS | Demonstration. Practical work. | Demonstration. Practical work. | Practical work. | Practical work. | Practical work. | Practical work. | |
| ANEA OF HJAWN REQUINDENT | Connecting electrical auters in the proper manner. | Inspecting the switch in the appliance for defects with a continuity testers or the appropriate electrical meter. | Inspecting the internal wiring connections for defects with a confinuity tester or the oppopulate electrical enter. | Inspecting for defective accessories: (a) Harters. (c) Regarts. (d) Curters. (e) Blades. (f) Barteries. | Inspecting the small mater appliance for defects. | Cleaning dirty components with a small brush. | |

| SUGGESTED EVALUATION PROCEDURES | Written quiz on reference meterial. Write an order for a replacement part. Observe the proper use of special tools. | Quiz on identification of faulty components as detected with instruments. | Quiz on Ohm's Lev. | Quiz on tile. | Quiz on film. Queck schemfics. | Students vill be saimed to determine the maifunction of an appliance by the symptoms. Mritten or oral exam. |
|--------------------------------------|--|--|---|---|--|---|
| SUGGESTED STUDENT ACTIVITIES | Meding drawings, schemetics, specifications and catalogues. Identifying components from drawings. Identifying special tools. Writing the specification for defective parts. | Reading setters connected to components to determine their condition. Hooking up the V.O.M. to components. | Computing Charle Law problems. | Listening to film. | Listening to film. Naking a schemulic to show a series circuit and peraliel circuit. | Students will observe maifunction and compare to troubleshooting chert to locate defective pert. Students will follow demonstration on the use of service manuals to recognize trouble aper. |
| SUGGESTED INSTRUCTIONAL MATERIALS | Menufacturer's service manual. Parts Lists. Taxtbooks: Mejor Appliance Servicing, Percy T. Brockell, Jr., McGraw-Hill Book Co., 1959, New York, N.Y., p. 211. Hor to Repair Smell Appliance, Jack Derr, Howard W. Sams & Co., Inc. (1965), p. 113. Electrical Appliance Servicing, William H. Crouse, I.C.S., Scranton, Pa., Serial 6729A (1965), p. 1-32. | Heating element appliance. V.O.N. Confincity tester. Textbook: How to Regir Electrical Appliances, Book Z (1985), H. P. Maily, Frederick J. Orale & Co., Publishers, Chapter 16. | Quiz on Ohm's Law. | Films: "introduction to Electricity," borrow from Corner Films, Wilmstte, iii. "Desic Electricity - The Electron Theory," borrow from Encyclepedia Britannice (5 min.). | Circuit board. Schemafics. Film: "Elements of Electric Circuits," rant from Encyclopedia Britannica. | Service centals. Appliance: Tenthoos: How to by self-small familiances Jack E by Housed W. Sams E Co., Inc. (1920). Simplified Electric, I Appliance Service College. Electric Company (1971). Olicago, 111. pp. 4-27. |
| SUGGESTED Teaching Nethods | Damonstration. Lacture. Practical work. | Demonstration. Practical work. | Practical work. | iji. | Omonstration. Film. | Demonstration. Practical work. |
| AREA OF HUMAN REQUIREMENT | Interpreting drawings, specifications, nanufacturer's catalogues, service manuals, schematics and handbooks to defarmine: (a) Installation procedures & techniques. (b) Service procedures. (c) Type, function & rating of defective part. (c) Electrical supplies. (e) Special service tools. (f) Electrical code. | interpreting the maters, readings to determine the condition of components. | Computing Ohm's Law to determine amperage, woltage, and resistance. | Explaining the electron theory of current flow in the appliance. | Explaining the characteristics of saries and parallel circuits used in the appliance. | Applying the proper procedure for diagonosing incorrect operation or maifunction. |

| | | ę <u>*</u> | <u>.</u> | <u> </u> | . | · · · · · · · · · · · · · · · · · · · |
|------------------------------------|---|--|--|---|--|--|
| SUGGESTED EVALUATION PROCEDURES | Observe the correct application of electrical anters. | Ask students to identify components on the appliance from a showerfic. | Observe the connection of maters in a circuit by students. | Quiz on identification of maters and their function. | Observation of storing and maintaining siectrical maters. | Obeck maters for correct callbration. |
| SUGGESTED STUDENT ACTIVITIES | impacting the appliance with electrical marters to determine grounds. | Listening to lecture, demonstration. identifying components in the appliance after locating them on a adminstic. | Connecting meters in a circuit correctly. | Students will determine test to be made and solect a unfer accordingly. | Melafaining autors in proper working condition. | Calibrating arters according to the manual peculiar to the mater. |
| SUGGESTED 1-YSTRUCTIONAL MATERIALS | Appliance, small. V.O.M. | App II anco. Schematics. V.O.M. | Wastlance. V. J. H. Carling in the Yester. Mithods: Haw to Small Electrical Mithods: Electrical Mithods: Electrical Mithods: Electrical Mithods: Electrical Mithods: Electrical Mithods: Mithods Mithods | Voltuniors America Continuity tester V.O.M. Tenthemes: Hew to Reseir Electrises Appliances, New 2 (1985) N.P. Feelishers, p. 264. Shaplified Electrical Appliance SAVICING Arthur Staplems, Simpsel III., p. 2-3. | Terrhecks: Hew to Mapair Major Appilances, Errent Tribens, Hemord H. Sens & Co., Inc. (1966), Chapter I. Simplified Electrical Appilance Servicing, Arthur Staplance, Simpen Electric Company (1966), Chicago, 111., p. 2-3. | Morters. Morters. Morters. Tecthosis. Tecthosis. Tecthosis. Appliance Servicing, Arthur Staplens, Simpson Electric Campany (1966), Chicago, III. |
| SUGGESTED TEACHING METHODS | Demonstration. Practical work. | Description. Lacture. Practical work. | Demonst (atlon. Practical work. | Demonstration. | Descritztion, Practical work. | Demonstration, Practical work, |
| AREA OF HJAWN REQUIREMENT | Applying the proper mathods of checking for electrical grounds. | Applying the proper procedure for tracing electrical circuits. | Recognizing the importance of proper connection of appropriate electrical maters. | Selecting the appropriate electrical orders for the job to be done: (a) Voltmarter. (b) Appmerer or amp-probe. (c) Continuity tester. (d) Volt-Ohm meter (V.O.M.) | Applying the proper care, maintenance, and storage of electrical maters. | Defermining the correct methods of inspecting, checking, calibrating electrical maters to known standards. |

Task No. 13 (continued)

| SUGGESTED EVALUATION PROCEDURES | Quiz on film. Quiz on safety rules and regulations. | Deferming students ability to recognize a defective switch. | Observe students ability to locate defective electrical connections with marters. | Observe students ability to recognize a defect in cord and plug. | Northwests test on connecting electrical appears. |
|--------------------------------------|--|---|--|---|--|
| SUGGESTED STUCENT ACTIVITIES | Observe safaty rules and regulations. Listen to film. | Tearing switches with meters and tasters to determine the condition of compensation. | Testing connections for defects with uniters. | Bring Sing a defect in the card or ping from electrotion. | Ownecting maters in a circuit according to the menual. |
| SUGGESTED INSTRUCTIONAL MATERIALS | Defective appliance. V.O.M. Tertbooks: How to Repair Electrical Appliance, Next 2 (1967), H. F. Fublishers, p. 265. How to Repair Small Appliance, Jack Darr, Howard M. Small Appliance, Jack Chirs, Howard M. Small Appliance, Jack Ellas: "The Factery: New a Freduct is Nede," borrow from Encyclopedia Britansica. | Osertimuity tester. V.O.M. Small heating element appliance. Smed and defective switch. | Corriently testers. V.O.M. Seel appliances. Seel appliances. Sectorical Textbook: Simplified Electrical Meliange Marricles Arthur States. Simple Marris Company (1966). Odempe. 171. | Study card and ping. | Appliance. Electrical meters: V.O.M. Appender - probe Carringlyy tester. Textbask: Simplified Electrical Appliance Servicing Arthur Stephens, Simpson Electric Carpeny (1960), Chicago, 111. |
| SUGGESTED TEACHING NETWODS | Demonstration. Lecture. Film. | Desertration. Fractical work. | Practical work. | Descritch well. | Descritcal work. |
| AREA OF HJAMN REQUIRENENT | Applying the proper safety precautions: (a) Meaning safety shoes with non-bonducting sales. (b) Memoring jewalry & Items of clothing with martal fasteners. (c) Avoiding work situations where malature is present. (d) Disconnecting the appliance before attempting servicing. | Inspecting the switch in the small electric heating appliance for defects with a continuity tester or the appropriate electrical mater. | Inspecting the internal wiring connections for defects with a continuity tester or the appropropriate electrical meter. | Visually inspecting for obvious defects in the cord and plug on the appliance. | Connecting electrical maters in the proper mather. |

ERIC

Task No. 13 (continued)

| SUGGESTED EVALUATION PROCEDURES | Observe the use of meters. Check students sellity to recognize defective components. | Tear students ability to separate good and bed components with maters. | Check to see that all components are properly cleaned. |
|--------------------------------------|--|---|---|
| STUDENT ACTIVITIES | Examining each accessory visually and with a V.O.M. as required to determine defects. | Students will make test of different components to defermine their condition. | Clearing compensate to Insure proper tweetlesing is the appliance. |
| SUGGESTED INSTRUCTIONAL WATERIALS | Defective appliance accessories. V.O.M. | Spectant (refective: Openitors Amisters Rementats V.O.M. | Small breaks. Companies and contrade, Tourisant: How to Result (1991). See and Co., Inc. (1965), p. 95. |
| SUGGESTED TCACHING METHODS | Practical work. | Demonstration. Practical vort. | Practical work. |
| ANEA OF HUMM PEQUINENENT | Inspecting for defective accessories: (a) Biankst and pad meterial. (b) Plastic foot and handles. (c) Insulation. (d) Pijot lights. (e) Grill plates. | Inspecting for defective capacitors, resistors and thermostats. | Cleaning dirty components with a small brush. |

TASK NO. 14: REPLACING THE DEFECTIVE PARTIS) OF THE SMALL ELECTRIC MOTOR APPLIANCES

| | - | | | | | | | |
|--------------------------------------|---|---|---|--|---|---|--|---|
| SUGGESTED EVALUATION PROCEDURES | Written quiz on reference meterial. Write an order for a replacement part. Observe the proper use of specie, foois. | Observe the usage of tools. | inspection of care, maintenance, an. iforage of tools. | Observe students at work, | Observe students at work. | Observetion. | Observe students at work. | Observe students. |
| SUGGESTED STUDENT ACTIVITIES | Reading drawings, schematics, specifications and catalogues. Identifying components from drawings. Identifying special tools. Mriting the specification for defective york. | Examining different types of: a. 'Screwdrivers.' b. Piles. c. Wrenches. d. Nutdrivers. Using the tools correctly. | Maintaining tools in working condition. | Holding, handling, and using tools carrectly. | Securing work for safe operation. | Tristing, pulling, and pressing with pilers. | Namove nut from bolt with pilers and observe damage. | Cutting wire with diagonal cutters. |
| SUZGESTED INSTRUCT:ONAL MATERIALS | Menufacturar's service manuci. Parts lists. Textbooks: Major Appliance Servicing. Percy T. Broc'well, Jr., McGraw-Hill Book Co. (1958), New York, N.Y. p. 211. How to Repair Small Appliance, Jack Derr, noward W. Same & Co., Inc. (1953), p. 113. Electrical Appliance Servicing, William N. Gromes, 1.C.S., Scranfor, Pe., Serial of ZM, (1965), pp. 1-32. | Screetivers. Pliers. Wranches. Murtarivers. Textbook: How to Repair Small Appliances, Jack Darr, Howerd W. Sees and Co., Inc. (1965), p. 113. | "ABC's of Handtools, published by General Notors. | Assorted hand wrenches. | Holding devices: clamps vices | Pilers. | Pilers. Nuts and boits. | Cutters. |
| SUGGESTED TEACHING METHODS | Demonstration. Lecture. Practical work. | Deconstration. Practical work. | Describeration, Practical work, | Description. Practical work. | Demonstration, Practical work, | Demonstration. | Demonstration. | Demonstration. Practical work. |
| AREA OF HANN REQUIPCHENT | interpreting drawings, sprcifications, manuals, schematics and handbooks to determine: (a) instaliation procedures & techniques, (c) Type, function & rating of defective part. (d) Electrical supplies. (e) Srecial service tools. (f) Electrical code. | Selecting the proper type and size of: (a) Scraudrivers. (b) Pilers (c) Wranches. (d) Cutters. (e) Nutdrivers. | Applying the proper cere, meintenance, and storage of tool: | Recognizing the proper methods of holding wrenches. | Applying the proper methods of holding the work. | Applying methods of holding pilers for pulling, pressing, and twisting. | Recognizing the results of using pliers for removing nuts and bolts. | Applying the proper procedures for cutting with diagonal cutters. |

Task No. 14 (continued)

| AREA OF Human Requirement | SUGGESTED TEACHING METHODS | SUGGESTED INSTRUCTIONAL MATERIALS | SINGESTED STUDENT ACTIVITIES | SUGGESTED EVALUATION PROCEDURES |
|--|-----------------------------------|---|--|---|
| Determining the proper methods of stripping wire. | Demonstration. Practical work. | Wire strippers. Wire. Wire. Wire. Taxtbook: Reliable Electrical Connections, Technology Handbook, Srd edition. MASA AP-2002, George C. Mershall Space Fight Center, Huntwille, Alabame, Dec. 1963, James A. Gey, Jr. | Removing the insulation from will swith strippers. | Observe students. |
| Selecting the proper type, size and tip soldering gun. | Described work. | Soldering gume. Tip essortment. Textbook: Reliable Electrical Connections, Technology Handbook, Sre adition. NASA SK-5002, George C. Mershall Space Fright Center, Huntiville, Alabama, Dec. 1963, James A. Gey, Jr. | Examining soldering guns and froms to defermine the best tip for the particular job. | Check to see the soldering gun and tip fit the job. |
| Recognizing the importence of timing the tip of the soldering iron. | Descrited work. | Soldering guns. Solder (rosin core). Flux. Steel woot. | Students will tin the soldering gun tip to insure the transmission of hest. | inspect the tinned soldering tip. |
| Determining the correct composition of solder to be used on the appliance. | Demonstration. Lecture. | Copper wire: Sold Stranded Soldering gun. Reain core solder. Soldering paste. | Determining the solder for copper wire by virtue of the core, rosin. | Observe the correct solder used on copper wire. |
| Recognizing the importance and purposes of flux when soldering. | Demonstration. Lecture. | Soldering flux. | Selecting the proper flux for appliance wiring. | Observe the correct usage of flux depending on the job. |
| Applying the proper method of transferring heat to work and applying solder to the joint. | Descustration. | Overlays of correct soldering methods. V.O.M. (for evaluation). Taxtbook: Electrical Appliance Servicing, William H. Grouse, T.C.S., Screiton, Pa., Serial 6729A (1969), | | |
| Recognizing the various types of festening devices: (a) Threaded festeners (b) Each and nut Cap screw Set screw Set screw Set screw Stacew Sheat matel & self-tapping screw Stud boit (b) Kays, rivots, and springs. (c) Cotter pins and shear pins. (d) Retaining rivots. | Demonstration. Practical work. | Various fastening devices. | • | |

Task No. 14 (continued)

ERIC AFUIT TEXT PROVIDED BY ERIC

| AREA OF HJAAN REQUIREMENT | SUGGESTED TEACHING METHODS | SUGGESTED INSTRUCTIONAL MATERIALS | SUGGESTED STUDENT ACTIVITIES | SUGGESTED EVALUATION PROCEDURES |
|--|--------------------------------------|--|---|--|
| Recognizing the various types and uses of washers. | Demonstration. Oisplay. | Assortment of various weshers. | Student determines the correct usage of washers. | Observe the proper application of washers. |
| Applying the proper method of installing threaded fasteners. | Damonstration. Practical work. | Handtools: Wrenches Nutdrivers Screwdrivers Threaded fasteners. | Installing threaded festenc.s to the appliance. | Observe the correct usage of tools as to not damage threaded festeners. |
| Recognizing the difference between right hand and left hand threads. | Demonstration. Practical work. | Parts manuels. Service manuels. Leff hand threads. Right hand threads. | Student will identify left and right hand threads. Need service menual and parts menual for application of left hand threads. | Test students ebility to reed service menual to determine location of left hand threads. |
| Applying the proper sefaty precautions: (a) Wearing sefaty shoes with non- conducting soles. (b) Removing Jewelry & Items of clothing with mertal fasteners. (c) Avoiding work situations where moisture is present. (d) Disconnecting the appliance before aftempting servicing. (e) Properly grounding appliance. | Desconstration. Lecture. Film. | Defective appliance. V.O.M. Toxtbooks: How to Repair Electrical Appliances, Book Z (1964), H. P. Henlishers, p. 265. How to Repair Small Appliances, Jack Darr, Howard W. Same & Co., Inc. (1965), p. 95. Film: "The Factory: How a Product is Made," borrow from Encyclopedia. Britannice. | Observe safety rules and regulations. Listen to film. | Quiz on film. Quiz on sefety rules. |
| Cleaning all dirty components with a small brush. | Practical work. | Small brushes. Components and controls. Textbooks. How to Repair Small Appliances, Jack Ebrr, Howard W. Smale & Co., Inc. (1965), p. 95. | Cleaning components to Insure proper functioning. | Check components visually. |
| Dressing the contacts on plug-in type elements with abrasive cloth. | Demonstration. Practical work. | Heating elements. Abrasive cloth Service menual. V.O.M. | Cleaning contacts. | Examine cleaned parts. Test with V.O.M. (resistence). |
| Soldering wires and electrical connections with a soldering Iron. | Demonstration. Practicel work. | Soldering iron. Soft solder. Flux. Apilence Wire (stranded) Wire strippers Textbook: Reliable Electrical Connections, Technology Handbook, 3rd edifion, pp. 21-28. NASA SP-5002, George C. Mershall Space Flight Center, Munistilla, Alabama, Dec. 1963, James A. Gay, Jr. | Students will make soldered connections as perscribed in Reliable Electrical Co-Connections, Technology Hardbook, Jrd edifion, pp. 21-28. | Inspect the soldered connections for cold joints and excessive heat. |

| SUGGESTED EVALUATION PROCEDURES | Observe the connection of maters in a circuit by students. | Quiz on identification of meters and their function. | Quiz on film. Check schematics. | Have students display their knowledge of heat transfer in soldering. | Written quiz. | Quiz on identification of faulty components as detected with instruments. |
|--------------------------------------|--|---|---|--|---|--|
| SUGGESTED STUDENT ACTIVITIES | Connecting maters in a circuit correctly. | Students will determine test to be made and select a mater accordingly. | Listening to film. Making e schematic to show e series circuit and persitei circuit. | Students will follow demonstration of the absorption of heat to prevent demage to components. Students will note the rate of solder martifling and location of soldering iron. | Determining type, size, and insulation of conductors. Recognizing insulators of different types. | Reading meters connected to components to determine their condition. Hooking up the V.O.M. to components. |
| SUGGESTED INSTRUCTIONAL MATERIALS | Heating element appliances. V.O.M. Continuity tester. Textbook: How to Sepair Electrical Appliances, Book Z (1964), H. P. Hanly, Frederick J. Drake & Co., Publishers, Chapter 16. | Quiz on Ohm's Law. | Circuit board. Schematics. Film: "Elements of Electric Circuits" rent from Encyclopedie Britannics. | Soldering Iron. Wire. Terminals. Textbook: Reliable Electrical Connections, Technology Handbook, 376 editions, p. 8. NASA SP-5002, George C. Nershall Space Filght Center, Huntsville, Alabame, Dec. 1963, James A. Gey, Jr. | Assorted Insulators and types of wire. Textbook: How to Repair Small Appliances, Jack Darr, Howard W. Same and Co., Inc. (1965), p. 65. | Appliances. V.O.M. Continuity tester. Continuity tester. Textbooks: How to Repair Electrical Appliances, Book 2 (1964), H. P. Kanly, Frederick J. Drake & Co., Publishers, p. 2.73. Simplified Electrical Appliance Servicing, Arthur Stephone, Simpson Electric Company (1966), Chicago, 111. |
| SUGGESTED TEACHING METHODS | Demonstration. Practical work. | Practical work. | Demonstration. Film. | Demonstration. | Demonstration. Practical work. | Demonstration. Practical work. |
| AREA OF HUMAN REQUIREMENT | interpreting the meter readings to determine the condition of components. | Computing Ohm's Law to determine amperage, voltage and resistance. | Expiaining the characteristics of series and parallel circuits used in the appliance. | Expisining the various mathods of heat transfer. | Excisining the function of conductors and insulators. | Recognizing the importance of proper connection of appropraise electrical maters. |

Task No. 15 (continued)

ERIC Fruit East Provided by ERIC

| SUGGESTED EVALUATION PROCEDURES | Quiz on Others Law. | Observe the storage and maintenance of electrical maters. | Check maters for correct calibration. | Student performence in correcting electrical meters. | Observe operation of assembled appliance. |
|--------------------------------------|--|--|---|--|--|
| SUGGESTED STUDENT ACTIVITIES | Computing Ohm's Law problems. | Maintaining maters in proper working condition. | Calibrating meters according to the menual peculiar to the meter. | Connecting maters in a circuit according to manual. | Checking assembled appliance with V.O.N. and/or continuity fester. |
| SUGGESTED INSTRUCTIONAL MATERIALS | Voltmaters. Ampmater. Conthaulty tester. Conthaulty tester. Textbooks: How to Repair Electrical Appliances, Book Z (1964), H. P. Hanly, Fraderick J. Drake & Co., Publishers, p. 264. Simplified Electrical Appliance Servicing, Author Stephone, Stepan Electric Company (1966), Chicago, 111., p. 2-3. | Terthooks: How to Repair Major Appliance, Ernef Triconi, Moverd W. Same & Co., Inc. (1969), Chapter I. Simplified Electrical Appliance Servicing, Arthur Stephone, Simpson Electric Company (1966), Chicago, III., p. 2-3. | Meters. Menuals. Textbook: Simplified Electrical Appliance Servicing, Arthur Stephons, Simpson Electric Company (1966), Chicago, 111. | Appliances. Electrical meters: | Continuity tester. V.O.M. Smell heating element appliance. Good and defective switch. |
| SUGGESTED TEACHING METHODS | Demons tration. | Demokstration. Practical work. | Damonstration. Practical work. | Demonstration. Practical work. | Demonstration. Practical work. |
| NREA OF HUMAN REQUIREMENT | Selecting the appropriate electrical maters for the job to be done: (a) Voltmater. (b) Augmenter or amp-probe. (c) Continuity tester. (d) Volt-Ohm mater (V.O.M.). | Applying the proper care, maintenance, and storage of electrical meters. | Determining the correct method of inspecting, checking, calibrating electrical meters to known standards. | Connecting electrical meters in the proper manner. | inspecting the appliance for defects with a continuity tester or the appropriate electrical mater. |

| Q |
|---|
| |
| Ž |
| |
| Ξ |
| Š |
| · |
| _ |
| v |
| |
| • |
| ş |
| ¥ |
| ᅕ |

ERIC Apultor Provided by ETIE

| AREA OF HUMAN REQUIREMENT | SUGGESTED TEACHING METHODS | SUGGESTED INSTRUCTIONAL MATERIALS | SUGGESTED STUDENT ACTIVITIES | SUGGESTED EVALUATION PROCEDURES |
|--|-------------------------------------|---|---|--|
| Recognizing the results of using pilers for removing nuts and bolts. | Demonstration. | Pilers. Nuts and bolts. | Namove nut from bolt with pliers and observe damage. | Observe the correct usage or pillers. |
| Determining the proper method of stripping wire. | Demonstration. Practical work. | Wire strippers. Hire. Textbook: Reliable Electrical Connections, Technology Hendbook, 3rd edition, p. 3. NNSA SP-5002, George C. Mershell Spece Flight Center, Huntsville, Alabeme, Dec. 1963, James A. Gey, Jr. | Removing the insulation from wire with strippers. | Observe students correctly strip wire. |
| Expleining the importance of observing recommended procedures when tightening down plates, covers, and flanges. | Demonstration. Practical work. | Handtools. Small heating element appilance. Service manuals. | installing cover plates on small appliances according to service manual procedures. | Observe the Installation procedures. |
| Applying the proper safety precautions: (a) Wearing safety shoes with non- conducting soles. (b) Removing jeweiry & Items of clothing with marial fasteners. (c) Avoiding work situations where moisture is present. (d) Disconnecting the appliance before attempting servicing. (e) Properly grounding appliance. | Demonstration. Lecture. Film. | Defective appliance. V.C.M. V.C.M. Textbook: How to Repair Smail Appliances, Jack Darri Howard W. Smail E. C., Inc. (1965), p. 95. Film: The Factory: How a Product is Mede, " borrow from Encyclopedia Britannica. | . Claten to film. | Quiz on film. |
| Replacing fasteners and cover plates with appropriate tools. | Demonstration. Practical work. | Handtools. Cover pletes. Service menuels. | Installing cover plates on appliances. | inspect appliance for correct usage of tools and assembly. |
| Cleaning eli dirty components with a small brush. | Practical work. | Small brushes. Components and controls. Textbook: How to Repair Small Appilances, Jack Derr, Howerd W. Sams & Co., Inc. (1966), p. 95. | Cleaning components to I sure proper functioning. | Observe cleaned components. |

| SUGGESTED EVALUATION PROCEDURES | Written quiz on reference material. Write an order for a replacement part. Observe the proper use of speical tools. | (Wiz on identification or reulty components as detected with instruments. | Listen for misinformetion. | Observe the connection of maters in a circuit by students. | Observe the storage and meintenance of electrical meters. |
|--------------------------------------|---|--|--|---|--|
| SUGGESTED STUDENT ACTIVITIES | Mading drawings, schematics, specifications, and catalogues. Identifying components from drawings. Identifying special tools. Writing the specifications for defective parts. | Reading seters connected to components to defermine their condition. Hooking up the V.O.M. to components. | Students lecture to their group, explaining the operation of an appliance. | Connecting maters in a circuit correctly. | Meintaining meters in proper working condition. |
| SUGGESTED INSTRUCTIONAL MATERIALS | Menufacturer's service menual. Parts Lists. Textbooks: Major Appliance Servicing. Percy T. Brockwell, Jr., McGrae-Hill Book Do., 1956, New York, N.Y., p. 21i. How to Repair Small Appliances, Jack Derr, Howard W. Same & Do., Inc. (1965), p. 113. Electrical Appliance Servicing. William H. Crouse, T.C.S., Scranton, Pa., Sarial 6729A (1965), pp. 1-32. | Heating element appliance. V.O.M. Outlinelty tester. Testbook: How to Repeir Electrical Appliances, Book 2 (1964), H.P. Reniy, Frederick J. Orske & Co., Publishers, Chapter 16. | An appliance: Toester Coffee maker Acom herter | Appliances. V.O.M. Omfinulty tester. Textbooks: How to Reselr Electrical Appliances, Book Z (1964), H. P. Henly, Frederick J. Drake & (bc., Publishers, p. 273. Simplified Electrical Appliance Servicing, Arthur Stephons, Simpson Electric Company (1966), Chicago, 111. | Textbooks: Now to Reself Mejor Apeliances, Ernest Tricoal, Movered W. Sme T. Oo., Inc. (1966), Chapter I. Slapilfied Electrical Apeliance Servicing, Arthur Stephone, Simpon Electric Company (1966), Chicago, Ill., p. 2-3. |
| SUGGESTED TEACHING METHODS | Demonstration. Practical work. Lecture. | Demonstration. Practical work. | Demonstration. Practical work. Lacture. | Demonstration. Practical work. | Demonstration. Practical work. |
| AREA OF HUMAN REQUIREMENT | Interpreting drawings, specifications, manufacturer's catalogues, service manuals, schematics and handbooks to determine: (a) Installation procedures & techniques. (b) Service procedures. (c) Type, function & rating of defective part. (d) Electrical supplies. (e) Esecutical supplies. (e) Esecutical services fools. (iv) Electrical services fools. | Interpreting meter readings to determine condition of components. | Explaining the basic operation of the appliance. | Recognizing the importance of proper connection of appropriate electrical maters. | Applying the proper care, meintenance, and storage of electrical meters. |

| SUGGESTED | EVALUATION PROCEDUPES | Check meters for correct calibration. | Observation. | Observation and practical exam. | Quiz on film. Observe student. |
|-----------|-------------------------|--|---|--|--|
| SUGGESTED | STUDENT ACTIVITIES | Calibrating meters according to the manual peculiar to the mater. | Operating appliance according to service manual. | Connecting V.O.M. to measure applied voltages. | View film. Test appliance with appropriate maters. |
| SUGGESTED | INSTRUCTIONAL MATERIALS | Manuals. Manuals. Taxtooks Simplified Electrical Appliance Servicing, Arthur Stephons, Simpson Electric Ompany (1966), Chicago, III. | Faulty eppllances. | Appliances. Electrical meters: Y.O.N. Asparar - probe. Continuity tector. Textbook: Simplified Electrical Appliance Servicing, Arthur Stephone, Simpson Electric Company (1966), Chicago, 111. | Film: "Home Electrical Appliances," il min., borrow from Encyclopedia Britannica. |
| SUGGESTED | TEACHING METHODS | Demonstration. Practical work. | Practical work. | Demonstration. Practical work. | £. |
| AREA OF | HUMAN REQUIREMENT | Determining the currect method of inspecting, checking, calibrating electrical meters to known standards. | Operating the appliance to determine performance. | Connecting electrical maters in the proper manner. | Inspecting the appliance for defects with a continuity tester or the appropriate electrical meter. |

| | ionarional straits. Vormational straits. Vications Occupational Outlook doods is S. Demartment of Lator. | Listening to speaker. Meking notes on: | Discussion. Written quiz on employment security |
|---|---|---|--|
| 8852 | 1965-67 delition, Mechington, D.C.: Government Printing Office, 1966. Childrin £1850-6, U.S. Department Childrin £1850-6, U.S. Department Fillp charts. | Number employed Employment outlook Mage rates Job requirements | office. Exployment trends (local and national); requirements (physical, mental); characteristics of work. |
| Lecture. Train Demonstration. Bath Guest speaker from the local union. | Transperencies to drawfize differences between the local level. The local level. | Match and interpret francparencies. Make notes on all phases of instruction. | Check the familiarity of the student with the wage scales of both unlon/non-unlon on the local and national level. |
| Lecture. Con Film. Film. Film. Film. Film. Tac Local recruiter. Special recruiter. Special recruiter. Special recruiter. Special recruiter. Tac Film. | Contact area appliance deelers. Film: "Back County Vocational- Technical Center," Williamsport, Pa. Speaker. Teacher-prepared information sheets. | Listen to spraker. Metch film. Meriting for information from appliance dealers and trade achools. | Observation and discussion. |
| Lecture - and/or guest Pub speaker from service Han shop. Gov Gov Buil Duil | Publication: Occupational Outlook Handbook, U.S. Department of Labor, 1965-57 edition, Weahington, D.C.: Government Frintling Office, 1966. Bulletin #1450-4, Department of Labor. Local service shop. | Students will follow speaker/teacher and take notes. | Cless discussion. |

OCCUPATIONAL INFORMATION UNIT FOR HOME APPLIANCE SERVICING (CONTINUED)

TASK NO. 1: DBSERVING THE SYMPTOMS TO DETERMINE THE DEFECTIVE STAGE OF THE RADIO

ERIC

| AREA CF HUMAN REQUIREMENT | SUGGESTED TEACHING METHODS | SUGGESTED INSTRUCTIONAL MATERIALS | SUGGESTED STUDENT ACTIVITIES | SYCRESTED EVALUATION PROCEDURES |
|--|---|---|--|--|
| Explaining the characteristics and function of radio waves. | Use science teacher if possible or lecture. | Chaikboard Charts Filmstrip: "Detection, Radio," USN 495 Summer St., Boston 10, Mass. | Make a wave chart in notebook showing various frequencies used in communication radio. TV, VHF, UHF, etc. Read text. | Quiz. |
| Explaining the function of oach stage of a radio. Reading block diagram to follow stages in a radio. | Filmstrips Lecture | Radio - block diagram of the superheterodyne:filmstrip Filmstrip: "Radio Servicing Series," WGHT - 6 strips, 37 frames each. Educational Media, Index 9, McGraw-Hill, p. 154. | Take notes and keep notebook, starting with a power supply and adding on until superheterodyne is completed in block form. Read text. | Written objective-type exam. Check notebooks. |
| Locating the different stages of a radio from the schematic diagram. | filustrate symbols on board and use of charts or board-size schematics. | Electronic Aid modules or other teaching mids (demonstrators). Schematics. | Draw a superhaterodyne schematic in notebooks. Read text. | Qu1z. |
| Interpreting drawings, specifications. Manufacturer's catalogs, service manuals, schematics and nandbooks. | Lecture Discussion | Schematics Handout - circuit symbols Service manuels | Practice locating information. | Quiz. |
| Applying the proper safety procautions: a. Wearing safety shoes b. Removing jewelry and clothes with metal fasteners. c. Avoding work conditions where moisture exists. d. Properly grounding the | Lecture Discussion Film | Film: "Safety Precautions for the Electronics Personnel," IB min. B & W, Order No. NU 6154, borrow from USN, Cat. No. OE - 34006 - U.S. Government Films. | Practice correct safety procedures. | include or task I exem. |
| installation procedures and tachniques. | Lecture Demonstration | Solder gun and iron. Necessary hand tools. Misc. components and terminals. | Solder connections. Work with related projects to acquire knowledge and gain more experience using toois. | Teacher observation. |
| Recognizing obvious broken parts of the radio. Visually inspecting for obvious defects in the cord and plug of the radio. | Lecture Demoistration Class discussion | Old radios. | Practice locating obvious broken parts in old radios "fixed" by instructor. | Cover on task I exem. |
| Listening to the radio to locate defects. | Lecture on use or local service person is desirable. | Radios Trouble shooting charts | Practice on radios manipulated by instructor. Start trouble-shooting chart in notebook. | Oral quiz on ability to locate trouble. |

| AREA OF HUMAN REQUIREMENT | SUGGESTED TEACHING METHODS | SUGGESTED INSTRUCTIONAL MATERIALS | CUGGESTED STUDENT ACTIVITIES | SUGGESTED EVALUATION PROCEDURES |
|---|--|---|--|--|
| Reading tube chart and tube manual to determine the type and rating of the tube. | Demonstration Film | Tube tester with chart, manual to tube tester being used, Film: "Tube Tester Operation," borlow from U.S. Government Films, Order No. NN 1540-P, Cet. No. OE - 3400E (9 min. film). | Read from text (section covering this topic in text you use). Find tubes and proper ratings on tube tester chart. | Quiz - oral or written. |
| interpreting meter readings of tube tester to determine tube conditions. Comparing measured tube values with specifications. | Lecture Demonstration Use of local serviceman, If possible or desirable. | Tube charts. Tube tester with manual. Tube characteristic manual. | Make sample chart in notebooks with tubes provided by teacher. | Check notebook work. Quiz - oral or written. (May be included on task 2 exam) Observation. |
| Operating a tube tester to determine condition of tubes: a. Straightening tube pins. b. Removing tubes from the chassis by hand or tube puller. C. Testing for gassy tubes. d. Testing for shorts or open fillaments. | Demonstration with a variety of tubes. | Supply of tubes. Tube tester. Tube puller. | Prectice testing tubes provided by instructor - remove and replace tubes in chassis. | Allow students to demonstrate ability to test tubes and care of equipment. Teacher observation. Quiz. |
| Recognizing: a. The different types of tubes by observation. b. The different types of tube sockers by observation. c. The different types of tube testers. | Lecture Demonstration Film | Various types of tubes and sockets. Available charts. Film: "The Dlode Principles and Application," buy from UNF, Order No. OE = 176, OE = 34006, U.S. Government Films (17 min.), R & W. | Take notes in notebook. Read in text. Make tube chart with tubes provided by the instructor. | Quiz - exemine more on task 2 exemination. |
| Explaining Ohms Law to show a relation between voitage, current, and resitance. | Lecture Demonstration Film | Chalkboard. Test panel. Nulti-meter. Dry cells. Resistors (low ohmage) Film: "Ohm's Law," U.S. Government Films, Order No. TF II = 1200), borrow from Army, Cat. No. 0E = 34006 (19 min.). | Read test. Do Ohm's Law problems In notebook, List formulas needed. | Written exemination. |
| Explaining the electron theory of current flow in the radio. | Lecture: Physics teacher may be used if desirabie. Film | Charts of the superheterodyne. Film: "The Electron Theory," U.S. Government Films, Cat. No. OE - 34006, NN 8016-a, borrow from USN. | Make chart of superhaterodyne in block form in notebooks, indicating flow of current. Read text. | Written exemination. |

TASK NO 3: REMOVING THE CHASSIS FROM THE CABINET FOR EASE OF SERVICING

| EVALUATION PROCEDURES | included on test covering entire task. | Teacher observation. | Written exemination. | Teacher observation. | Quiz and observe. | Teacher observation. |
|--------------------------------------|--|---|---|--|---|--|
| | Follow on schematics as teacher expiains. Read text and take notes in notebook. | Practice on radios provided by Instructor. | Te'a notes in notebooks. | Practice soldering on old radio chassis provided by instructor. Practice stripping wire. | Use the tools as demonstrated and practice to become more proficient. | Practice tinning a soldering gun tip or iron. |
| SUGGESTED INSTRUCTIONAL MATERIALS | Radios Schematics | Soldering gun and solder Appropriate Tools: Nut Drivers Screedrivers Long nose pilers Radios | Screwdrivers Wrenches Pilers Cutter, etc. | Old radio Soidering gun and iron Soidering wire Tools for stripping | Screwdrivers Wrenches Plers Cutters, etc. | Soldering Iron File Solder |
| SUCSESTED TEACHING METHODS | Demonstration. Lecture. | Demonstration. | Demonstration. Lecture. | Demonstration. | Demonstration. | Demonstration. |
| AKEA OF HUMAN REQLIREMENT | Reading the manufacturer's schematic to find the disconnect point of the antenna. | Disconnecting line cord from wall receptacie. Removing knobs from cabinet. Unsoldering antenna leads. Removing fasteners holding the chassis to the cabinet using proper tools. | Arranging parts in an orderly procedure to prevent loss or damage. Selecting the proper type: (a) screwdriver (b) wrench (c) pilers (d) Curters (e) Fastening devices (f) Washers | Soldering with gun or iron. Stripping wire. | Learning the proper method of using hand tools used in radio repair. | Tinninga soldering iron. |

TASK NO. 4: ISOLATING THE DEFECTIVE COMPONENTS IN A PARTICULAR STAGE OF THE RADIO

| TEACHING METHODS INSTRUCTIONAL MATERIALS STUDENT ACTIVITIES | Lecture. Charts of the superheterodyne. Physics teacher may be Film: "The Electron Theory." U.S. Government Films, OE - 34006, Film | Lecture. Radio - block diagram of the power supply and adding on until superhet is completed in block form Filmstrips. Filmstrips. Radio Servicing Series." Read text MGHT - 6 strips, 37 frames each, Educational Media index 9, McGraw-Hill, p. 154. | ponent | Lecture. Supply of resistors Practice finding the value of resistors Test on ten or so resistors selected V.O.M. V.O.M. Color code chart Make color code chart in notebook. | Demonstration. Chalkboard Tast panel Tast panel Programmed Lesson: Basic Electricity from A.T.&T. Programmed Instruction. | > 0 E | Demonstration. V.O.Mv.T.v.M. Charts - schematics Radio Large panel radio if possible Read text. | V.O.M. V.T.V.M. Demonstration. V.T.V.M. Schematic readings. Teacher observet on. |
|---|---|--|---|---|---|--|--|--|
| HUMAN REQUIREMENT | Explaining the electron theory of current flow in the radio. | Explaining the function of each stage of the radio. | Recognizing the various parts of the radio. | Recognizing the color code of resistors. | Computing Ohm's Lew to datarmine emparage, voltage, and resistance. | Messuring resitance, voltage, and current flow in the different stages of the radio using the appropriate electrical maters. | Interpreting meter readings to determine the condition of the components. | Checking the resistence in a perticular stage of a radio with V.O.M. |

| AREA OF HUMAN REQUIREMENT | SLYJESTED TEACHING METHODS | SUGGESIEU INSTRUCTIONAL MATERIALS | SUGGESTED STUDENT ACTIVITIES | SUGGESTED EVALUATION PROCEDURES |
|--|---|--|--|--|
| Connecting electrical metar in the proper manner. | Demonstration. | V.O.M. V.T.V.M. Schematic Radio | Practica taking resistance readings. | Teacher observation. Quiz. |
| Applying the proper care, meintenance and storage of electrical metars. | Demonstration. | V.O.M. V.T.V.M. | Practice caring for maters. | Teacher observation. |
| Determining the correct method of inspecting, checking, and calibrating electrical meters to known standards. | Demonstration. | V.O.M. | Practice calibrating maters. | Teacher observation. |
| Selecting the appropriate electrical meters for the job to be done. | Demonstration. Lecture. | V.T.V.M. | Take notes. Read text. | Quiz. |
| Recognizing the importance of proper connections when using electrical meters. | Demonstration. | Radio Motors | Take notes. Read text. Practice connecting meters. | Quiz. |
| Inspecting the components with meters to aliminate possible causes of trouble until defect is found. | Demonstration. | Radios Meters (V.O.M V.T.V.M.). Schemetics | Practice making inspection on radios provided by instructor. | Teacher observation. |
| Reading the menufacturer's service reference for possible causes of trouble. | Demonstration with radir. | Trouble shooting charts. Radios. | Practice locating defect from symptoms provided by instructor. Need text. | Writtun examination. Diffo schematics with components to place |
| Reading the manufacturer's schematic to locate the components. | Lecture with students following on schmatic. | Scharafics | Following on schematics. Take notes. | Written examination. Diffo schematics with components to place or locate. |
| Injecting a signal in the proper sequence to isolate the defective stage with a signal generator. | Demonstration. Lecturs. Filta. | Signal generator Radio (panel type if available). Diagram (block) Schematics Film: "Signal Generator (peration," U.S. Government Films; OE-34006, borrow from U.S.N., Order No. HN 1540-9. | Practice injecting signals in various parts. | Quiz. |
| Applying the proper safaty precautions: (a) Wearing safaty shoes with non- conducting solas. (b) Removing jeweiry and items of clothing containing metal asteners. (c) Avoiding work situations where moisture is present. (d) Disconnect the radio frum the power supply. (e) Discharging the capatiors of the radio. (f) Properly grounding the radio. | Demonstration. Lecture. | Solder gun and Iron Necessary hand tools Misc. components and terminals | Solder connections. Work with related projects to acquira knowledge and gain more experience using tools. | Teacher observation. |

TASK NO. 5: REPLACING THE DEFECTIVE COMPONENTS IN A PARTICULAR STAGE OF A RADIO

| area of Hjavan requirement | SUGESTED TEACHING METHODS | SUCCESTED INSTRUCTIONAL MATERIALS | SUGGESTED STUDENT ACTIVITIES | SUGGESTED EVALUATION PROCEDURES |
|---|--|--|--|---|
| Selecting the appropriate maters for the job to be done. | Demonstration. Lecture. | V.O.M. V.T.V.M. | Take notes. Reed notes. | Quiz. |
| Determining the correct method of inspecting, checking, end calibrating meters to known standards. | Demonstration. | V.D.M. | Practice calibrating meters. | Teacher observetion. |
| Applying the proper care, maintenance, and storage of electrical maters. | Demonstration. | V.D.M. V.T.V.M. | Practice caring for meters. | Teacher observation. |
| Recognizing the importance of proper connections of maters. Connecting maters in a proper manner. | Demonstration. | indicate the second sec | Practice connecting maters. Take notes. Need tout. | Quiz. |
| Reading the menufacturer's schematic to determine value and location of the components. | Lecture with students following on schemetic. | Schematics | Following on achemetics. Take notes. Need text. | Written examination. Difto schematics with components to place or locate. |
| Measuring the replacement components to determine correct values with the appropriate meters. | Demonstration. | V.O.M. V.T.V.M. Components | Practice asking sessor seents with seters on components supplied by instructor. | Quiz. |
| Recognizing the results of using pilers for removing nuts and boits. Applying methods of holding pilers for pulling, pressing, end twisting. Applying the proper methods of holding the work. Selecting the proper type end size of: (a) screwdrivers (b) pilers Applying the proper care, maintenance, and storage of foois. Applying the proper care, maintenance, and storage of foois. | Demonstration. | Radio chasis Various screadfivers and pilers Mire curters Diagonal curters Components Soldering gun and solder | Fractice using the various small hand tools used in radio repair. Namove and install components. | Teacher observation. |
| Determining the proper method for stripping wire. | Demonstration. | Length of various size wire (insuleted) Wire cutters - strippers | Practice stripping wire provided by instructor. | Teacher observation. |

Task No. 5 (continued)

| SUGGESTED EVALUATION PROCEDURES | Teacher observation. | Teacher observation. | Cover on examination covering entire task. | Cover on examination | Cover on examination. | Cover on examination. |
|-----------------------------------|--|--|--|--|---|--|
| SUGGESTED STUDENT ACTIVITIES | Practice replacing cord and plug on old radios provided by instructor. | Practice removing components from oid radios. | Take notes. | Read solder gun manuel and practice using sefety precentions. | Practice soldering while protecting components from excessive heet. | Practice testalling components in old-redio chassis. |
| SUGGESTED INSTRUCTIONAL MATERIALS | Length of parallel wire and plugs Redio | Soldering gun Old radios Diagonal cutters Needle-nose pilers | Acid-core solder Rosin-core solder Soldering iron | Radie chassis and soldering gun | Cheikboerd Solder gun Redio chesis Hend tools Hend tools Hend sinks (or alligator clips) Seell components | Redio chessis Hand tools Solder gun Rosin core solder Misc. capacitors and resistors |
| SUGGESTED TEACHING METHODS | Demonstration. | | Demonstration. | Demonstration. | Demonstration. Lecture. | Demonstration. |
| AREA OF HLMAN REQUIREMENT | Replacing the defective cord or plug. | Removing the defective components from the chassis with a soldering gun and appropriate tools. | Recognizing the corrosive effects of acid on copper. Recognizing the importance of using only rosin corrections. | Practice safe working procedures when soldering. | Exercising care to prevent damage to components with heat when soldering. | Replacing new components in the circuit with a soidering gun and appropriate tools. |

| , | <u>.</u> | Mit del to be Waren right name (Cal | | | | | | |
|---|--------------------------------------|---|---|--|---|---|---|---|
| | SUGGESTED EVALUATION PROCEDURES | Teacher observation. Caver on examination. | Teacher observation. | Teacher ebservation. | Teacher observation. | Teacher observation. | Toacher observation | |
| | SUCCESTED STUDENT ACTIVITIES | Practice working with the various festeners on old radios. | Fractics sales the verteus small hand tools used in radio repole. Names and install compensatio. | Fractice using the various small hand tools used in radio repair. | Practice atripping vire provided by instructor. | Fractice using the various small hand tools used in radio repair. Remove and install components. | Practice using the various small hand tools used in TV repair. Nearows and Install cooponents. | , |
| | SUGGESTED Instructional materials | Assortment of fastening devices Masher Various hand tools | feelo chesis Various screedrivers and pilers Vire cutters Ologoni cutters Components Soldering gen and solder | Medio chassis Various screndrivers and pliers Vire cutters Diagness cutters Congenity Soldering gas and relder | Langth of various size wire (Insulated) Wire cutters - strippers | Medio chassis Various acreditivers and pilors Whire cutters Diagonal cutters Components Soldering gun and solder | Nation chastis Various screedrivers and pilers Nitre cutters Disgonal cutters Components Soldering gun and solder | |
| | SUGGESTED TEACHING METHODS | Demonstration. L≅c⊺ore. | Demonstration. | Desconstration. | Demonstration. | Demonstration. | Demonstration. | |
| | AREA OF HJAVAN REQUIREMENT | Recognizing the various types of festening devices. Recognizing the various types, uses, and characteristics of the added festeners. Recognizing the various types and uses of weekers. Applying the proper mathods of installing thereaded festeners. Recognizing the difference batteen right and left hand thread. | Selecting the proper type and size of acreadriver, pliers, cutters, etc. | Applying the proper procedure for cutting with diagonal cutters. | Determining the proper author of stripping wire. | Recognizing the results of using pilers for removing nuts and bolts. | Applying methods of holding pliers for pulling, pressing, and twisting. | |
| | | | | | | | | |

Task No. 6 (continued)

ERIC .

| SUGGESTED EVALUATION PROCEDURES | various small Teacher inservation. radio repair. components. | various small Teacher observation. radio repair. | the proper Teacher observation. weing various Coverad on written examination on entire task. king notes. | usi and Cover on examination. by precautions. Cover on examination covering | Practice replacing chassis in the cabinet, Teacher observation. attaching all fasteners with appropriate tools. |
|--------------------------------------|---|---|---|---|--|
| SUGGESTED STUDENT ACTIVITIES | Practice using the various small hand tools used in radio repair. Remove and Install components. | Fractice using the various small hand tools used in radio repair. Remove and install components. | Practice selecting the proper soldering up or Iron, tinning same and soldering using varioutypes of solder and flux. Reading text and taking notes. | Need solver gun menual and practice using sefety precautions. | Practice replacing attaching all fast tools. |
| SUGGESTED INSTRUCTIONAL MATERIALS | Radio chassis Various screwdrivers and pilers Wire cutters Diagonal cutters Components Soldering gun and solder | Radio chassis Various screadrivers and pilers Mire cufters Disgonal cufters Components Soldering gun and solder | Various solders Soldering gun Soldering Irons Files - fluxes Old chassis and components | Redio chassis Soldering gun Soldering gun Acid-core solder Rosin-core solder | Schematics Schematics Soldering gun Soldering gun Soldering gun Soldering gun Soldering gun Soldering gun Mat drivers Krewdrivers |
| TEACHING METHODS | Demonstration. | Demonstration. | Demonstration. Lecture. | Desconstration. | Demonstration. |
| HUMAN REQUIREMENT | Applying the propor method to hold work. | Applying the proper care, maintenance and storage of fools. | Selecting the proper types and sizes of soldering gun or iron. Prognizing the importance of timingshe tip of the soldering gun or iron. Defermining the correct composition of solders to use on the radio. Recognizing the importance and purpose of flux when soldering. Applying the proper method of transferring heat to work. Selecting the correct solder and flux. Selecting the proper method of applying solder. | Practice safe working procedures when soldering. Recognizing the importance of using only rosin core solder | On electrical commertions. Replacing all machanical fasteners using the appropriate tools. Reading the manufacturer's schematic to find the connecting point of the built-in ambans. |

TASK NO. 7: MAKING FINAL OPERATIONAL CHECKS AND ADJUSTMENTS TO THE RADIO

| SUGGESTED EVALUATION PROCEDURES | ca÷ing Quiz. Cover on task 7 exem. | 8 12. | Cover on task 7 axamination. | sors Cover on tesk 7 examination. | hand Teacher observation. |
|--------------------------------------|--|---|---|--|--|
| SUGGESTED STUDENT ACTIVITIES | Practice to gain experience in locating loose connections. | Practice on radios that hate been tampered with by instructor. | . Take notes. | Practics adjusting trimmer condensors using signal generator and meter. | Practice using the various small hand tools used in radio repair. Ramove and install components. |
| SUGGESTED INSTRUCTIONAL MATERIALS | Radio | o D | Assortment of screndrivers (insulated) | Madio and schematics Chart Signal generator V.T.V.M. | Medio chesis Various screedrivers and pliers Mire cutters Diagonel cutters Components |
| SUGGESTED TEACHING METHODS | Demonstration. | Demonstration. Lacture. Local service person perheps useful in this | Lacture. | Lecture. Use of service person If desirable. | Demonstration. Lecture. |
| area of Human requirement | Plugging the radio into outlet. Tuning the radio to a local station. Checking for loose connections. | Listening to the radio on e selected frequency to determine performance. Recognizing correct operation from the audio signal. | Selecting the proper type and size of screwdrivers. | Adjusting trimmer condensers to peak output position with a screwdriver. | Applying the proper cais, maintenance and storage of tools. |

TASK NO. 8: OBSERVING THE SYMPTONS TO DETERMINE THE DEFECTIVE STAGE OF THE TELEVISION SET

| Explaining the characteristics and functions of each stage of the T.V. Serinctions, menusarings, specifications, menusarings, specifications, menusarings, specifications, menusarings, schemetics and handbooks. Recognizing the audio signal characteristics to localize defects. Cicheracteristics to localize defects. Cicheractive stage of a television. | Lecture. Sarvice person useful if desired. Lecture. Demonstration. Lecture. Classroom TV - bring in local service man if desirable. Demonstration. | Schematics - TV set Transparency - teacher precared block diagram block diagram Schematics Schematics Service manuals Handout - circuit symbols Television set Trovièle-shooting charts | STUCENT ACTIVITIES Draw a block diagram of a television set and write a description of each in notebook. Practice locating information. The television by the instructor. Red trouble-shooting cherts and keep notes in notebook. | SUGGESTED EVALUATION :ROCEDURES Written objective type examination, or open-book exam, or performance test. Teacher observation. |
|--|--|---|---|--|
| | | | ·Reid are and redell | |

| MEA OF HANNA REQUIRES ENT | SUGGESTED TEACHING NETHODS | SUGGESTED INSTRUCTIONAL MATERIALS | SUGGESTED STUDENT ACTIVITIES | SUGGESTED EVALUATION PROCESURES |
|--|--|---|---|---|
| Reading tube (short and tube manual to determine the type and rating of the tube. | Damastration. | Tube tester with chart - menual to tube tester being used Film: "Tube Tester Operation," 9 min., U.S. Government Film, GE-34006, berrew frum U.S.M., Greer No. HM 1340-P. | Read from text (section covering this topic in text you use). Find tubes and proper ratings on tube tester chart. | Quiz - oral or written. Teacher observation. |
| interpreting mater readings of the teature to determine take conditions. | Casture. Lasture. Use of local service men if pessible. | Tube cherts Tube tester with manual Tube cherecteristic manual | Make sample chart in notebooks with tubes provided by teacher. | Check notebook work. Test - oral or written(may be included on task 2 exam). Observation. |
| Charafing a title teater to deforming amusifiem of titles. (a) Straightening title ples (b) Teating the start (c) Teating for short (d) Teating for short | Demonstration (see of variety variety variety variety). Lecture. File. | Supply of twees Tuke fusher Tuke puller Film: "Take Tostor Operation," 9 min., U.S. Severnment Film, OC-2008, berrue from U.S.M., Order No. 80 1940-F. | Fractice testing tubes provided by instructor. Numero and replace tubes in chassis. | Allow students to demonstrate ability to test tubes and care of equipment. Teacher observation. Q:12. |
| Sempoliting the different types of types by description. Recognizing different types of two sectors. Recognizing different types of | Latter. | Verious types of takes and sacials Assistate charts File: "The Diede Principles and Appliantion," U.S. Guarament Files, (17 516.), D.A. W. Order No. GE-176, buy from U.M.F., GE - 34006. | Take meter in navablook. Read in text. Rete take chert with tubes provided by instructor. | Quiz - examine more on task 2 examination. |
| interpreting drawings, specifications, carlens, carbings, service menuals, schemotics, ofc. | Blomesion. Latture. | Schamefics Service manuals Handburt - circuit symbols | Practice teasting information. | # # # # # # # # # # # # # # # # # # # |
| Explaining the electron theory of current flow in the tolovision. | Corture. Cor | Biest diagram of a tolovision schamping. Tolovision. Teacher-ands everlay (bleat diagram). | Make black diagram of tolovision with written emploinations of each stage. Foliou on achamptics. Read chapter or section of text in use which covers the information. | Written objective type examination |

| AREA OF HUMAN REQUIREMENT | SUGGESTED TEACHING METHODS | SUCCESTED INSTRUCTIONAL MATERIALS | SUGGESTED STUDENT ACTIVITIES | SUGSESTED EVALUATION PROCEDURES |
|---|-------------------------------------|--|---|---|
| Selecting the proper type and size screwdriver and nutdrivers. Applying the proper care maintenance and storage of tools. Recognizing the various types of fastening devices. Recognizing the various types, uses, and characteristics of threaded fasteners. Recognizing the various types, washers. | Demonstration. Lecture. | T.V. sets Nutdalvers Screwdrivers Assorted fasteners | Practice working with the tools on "junkers" provided by the instructor. | Cover on task 10 ex.m (performance exam). |
| removing threaded fasteners. Recognizing the difference between right and left lend thread. Removing back cover screws. Removing chassis mounting boits with appropriate tools. Removing knobs from front of set. | Demonstration. | Soldering gun and solder. Nutdrivers Screedrivers Long-nose pilers Redios | Practice on radios provided by instructor. | Taacher observation, |
| Arrangling parts in an orderly procedure to prevent loss or damage. | Demonstration. Lecture. | Screwdrivers Krenches Pilers Cutters, etc. | Take notes in notebooks. | Written exemination. |
| Discharging the static charge from the picture tube and high voltage tubes with a screwdriver. | Demonstration. Lecture. | T.V. set Hand tools Test Leads | Practice discharging cathode ray and power vectifier tubes in classroom television set. | Teacher observation.and Cover on task 10 evam. |
| Applying the proper safety precautions: (a) Safety shoes (b) Removing jeweiry (c) Avoiding moisture (d) Disconnecting power (e) Discharging capecifors (f) Grounding television | Demonstration. Lecture. Flim. | Film: "Safety Preceutions for the Electronics Personnel," 18 mir. B & W, Order No. MN 6754, borrow from U.S.N., Catalog No. 0E-34006, U.S. Gevernment Films. | Practice correct safety procedures. | Include on task I exam. |

TASK NO. 11. ISOLATING THE DEFECTIVE COMPONENT IN A PARTICULAR STAGE OF THE TELEVISION SET

| AREA OF HUMAN REQUIREMENT | SUGGESTED TEACHING METHOCS | SUGGESTED INSTRUCTIONAL MATERIALS | SUGGESTED STUDENT ACTIVITIES | SUGGESTED EVALUATION PROCEDURES |
|--|---|--|--|--|
| Explaining the electron theory of current flow in the television. | Lecture. (physics teacher may be used if desirable) Film | Chalkboard D'agram | Make chart of superhet in block form in rotebooks indicating flow of current. Reed text. | Written exemination |
| Explaining the function of each stage of the television. | Lecture. (local service person may be he!pful) | Charts - RCA Diagrams (feacher made) Chaikboard Demonstrator | Make 5 block diagram of a tatavision receiver. Keep notes. | Written examination |
| Reading manufacturer's service reference charts for possible cause of trouble. | Demonstration. Lecture. | Trouble-snooting charts TV sets | Practice locating defect from symptoms provided by instructor. Reed text. | Written exemination |
| Reading manufacturer's schematic to locate components. | Lecture with students following on schematic. | Schematics | Following on schematics. Read text. Take notes. | Written examination Ditto schematic with components to place or locate |
| Recognizing the color code of resistors. | Lecture. | Supply of resistors V.C M. Color code chart | Practice finding the value of resistors provided by instructor. Make color code chart in notebook. | Test on ten or so resistors selected by the instructor |
| Computing Ohm's law to determine amperage, voitage, and resistance. | Lecture. Demonstration. Film. | Chalkboard Test panel Multi-mater Dry cells Resistors (low ohmage) Film: "Ohms Eaw," 19 min., Order No. TF II - 1200, borrow from Army, Cat. No. OE-34006. | Read text. Do Chai's Law problems in notebook. List formulas needed. | Written exemination |
| Applying the proper care, maintenance, and storage of maters. | Demonstration. | V.O.M. V.T.V.M. | Practice caring for maters. | Teacher observation |
| Determining the correct method of inspecting, checking, calibrating meters to known standards. | Demonstration. | V.O.M. V.T.V.M. | Practice calibrating maters. | Teacher observation |
| Salecting the appropriate maters for the job to be done. | Demonstration. Lecture. | V.O.M. | Take notes. Read text. | 212 |
| | | | | |

TASK NO. 12: REPLACING THE DEFECTIVE COMPONENTS IN A PARTICULAR STAGE OF THE TELEVISION

ERIC Prull that Provided by ERIC

| AREA OF HUMAN REQUIREMENT | SUGGESTED TEACHING METHODS | SUGGESTED INSTRUCTIONAL MATERIALS | SUGGESTED STUDENT ACTIVITIES | SUGGESTED EVALUATION PROCEDURES |
|---|---|--|--|--|
| Reading a schematic to determine values and locations of components. | Lecture with students following on schematic. | Schanatics | Following on schametics. Take notes. Read text. | Written examination Ditto schematic with components to place or locate |
| Recognizing the color code of resistors. | Lecture. | Supply of resistors. V.O.M. Color code chart | Practice finding the value of resistors provided by instructor. Make color code chart in notebook. | Test on ten or so resistors selected by the instructor. |
| Applying the proper method of holding the work. | Demonstration. | TV chassis Various acreadrivers and pilers Wire cutters Diagonal cutters Components Soldering gun and solder | Practice using the various small hand tools used in television repair. Remove and install components. | Teacher observation. |
| Selecting the proper type and size: Screwdriver Cutters Pliers Nutdrivers | Demonstration. | TV chassis Various screed ivers and pilers Wire cutters Diagonal cutters Components Soldering gun and solder | Practice using the various small hand tools used in television repair. | Teacher observation |
| Applying methods of holding pliers for pulling, cressing, and twistics | Demonstration. | TV chassis Various screedrivers and pliers Wire cutters Diagonal cutters Components Soldering gun and solder | Practice using the various small hand tools used in television repair. Remove and install components. | Teacher observation |
| Recognizing the results of using pliers for removing nuts and bolts. | Demonstrætion. | TV chassis Various screedrivers and pilers Wire curters Uigment cutters Components Soldering guit and solder | Practice using the various small hand tools used in television repair. Remove and install components. | Teacher observation |
| Selecting the proper types and sizes of cutters. Applying the proper procedures for cutting with diagonal | Demonstration. | TV chassis Various screwdrivers eru pliers Wire cuttere Diagnal cutteru. Camponents Soldering gun and solder | Practice using the various small stand tools used in television repair. Remove and install comments. | Teacher observation. |
| Recognizing the various types of fastening devices. | Demonstration. Lecture. | Assortment of fastening devices Meshers Various hand tools | Practice working with the various fasteners on oid \mathbf{TV}^{s} . | Teacher observation |

ERIC

Fall fast Provided by ERIC

Task No. 12 Contin

| AREA OF HUMAN REQUIREMENT | SUGGESTED TEACHING METHODS | SUGGESTED INSTRUCTIONAL MATERIALS | SUGSESTED STUDENT ACTIVITIES | SUGGESTED EVALUATION PROCEDURES |
|---|-------------------------------|--|--|--|
| Recognizing the various types, uses, and characteristics of threaded fasteners. | Demonstration. Lecture. | Assortment of fastening devices Weshers Various hand tools | Practice working with the various fasteners on old TV's | Teacher observation |
| Recognizing the verious types and uses of weshers. | Demonstration. Lecture. | Assortment of fastening devices Meshers Various hand tools | Practice working with the various fasteners on oid $TV^{\dagger}s$. | Teacher observation |
| Applying the proper methods of installing threaded fasteners. | Demonstration. Lecture. | Assortment of fastening devices Meshers Various hand tools | Practice working with the various fasteners on old TV's. | Teacher observation |
| Recognizing the difference between right and left hand thread. | Demonstration. Lecture. | Assortment of fastening devices Mashers Various hand tools | Practice working with the various fasteners on old TV's. | Teacher observation |
| Dateraining the proper method of stripping wire. | Demonstration. Lecture. | Various soiders Soidering gun Soidering Irons Files - fluxes Old chassis and components | Practice selecting the proper soldering gun or Iron, timing same and soldering using various types of solder and flux. Reeding text and taking notes. | Teacher observation - covered on written examination on entire task. |
| Applying the proper care, mainten- ance, and storege of tools. | Demonstration. | TV chassis Various screadrivers and pilers Wire cutters Diagonal cutters Components Soldering gun and solder | Practice using the various small hand tools used in TV repair. Remove and install components. | Teacher observation |

| Selecting the proper types and size of soldering gun or iron. Selecting the proper tips for same. Recognizing the importance of timing the tip of a gun or iron. Defermining the operance of composition of solder. Recognizing the importance of using flux. Applying the proper method of transferring heat. Selecting the proper solder and flux. Selecting the defective component to apply solder. Selecting the defective component to apply solder. Selecting the new component in the chassis with a soldering gun and tools. Meplacing the new components in the chassis with soldering gun and tools. Meplacing the new components in the chassis with soldering gun and tools. | INCLINATE MILETING | STUDENT ACTIVITIES | EVALUATION PROCEDURES |
|---|---|--|--|
| Demonstration. | Various soiders Soidering gun Soidering irons Files - fluxes Oid chassis and components | Practice selecting the proper soldering gun or iron, tinning same and soldering using various types of solder and flux. Reading text and taking notes. | Teacher observation - covered on written examination on entire task. |
| Demonstration. | Soldering gun Old TV Diagonal cuffers Needle-nose pilers | Practicing removing components from oid TV's. | Teacher observation |
| | TV chassis Hand tools Soider gun Rosin core soider Misc. capacitors and resistors | Practice installing components in old TV chessis. | Ower on expelhation |
| Replacing the defective cord Demonstration. La and/or plug. | Langths of parallel wire and plugs TV | Practice replacing cord and plug on old TV's provided by instructor. | Teacher observation |
| | | • | |

TASK NO. 13: REPLACING THE CHASSIS IN THE CABINET AFTER THE FINAL INSPECTION OF THE TELEVISION SET

| MEA OF HUMM REQUIRDENT | SUGGESTED TEACHING METHODS | SUCCESTED INSTRUCTIONAL MATERIALS | SUGGESTED STUDENT ACTIVITIES | AUGESTED EVALUFTION PROCEDURES |
|---|-------------------------------|--|---|--------------------------------|
| Selecting the proper type and size: Screed:lvnr Lavels Filers Nutdilver Fullers Hamer Wrenches Chisel Outters Funches | Demonstration. | TV chasts Various screadrivers and pilers Mire cutters Diagonal cutters Components Soldering gun and solder | Practice using the various small hand tools used in TV repair. Remove and install components. | Teacher observation |
| Applying the proper method of holding work. | Demonstration. | TV chessis Various screedrivers and pilers Wire cutters Diagonal cutters Components Soldering gun and solder | Practice using the various small hand tools used in TV repair. Remove and install components. | Teacher observation |
| Applying methods of holding pilers for pulling, pressing, and twisting. | Demonstration. | TV chassis Vericus screedrivers and pilers Nire cutters Diagonal cutters Components Soldering gun and solder | Practice using the various small hand tools used in TV repair. Namove and install components. | Teacher observation |
| Recognizing the results of using pilers for removing nuts and bolts. | Demonstration. | TV chassis Various screeningers and pilers Wire cutters Olagonal cutters Components Soldering gun and solder | Practice using the various small hand tools used in TV repair. Remove and install components. | Teacher observation |
| Applying the proper procedure for cutting with diagonal cutters. | Desconstration. | TV chees is Various screed livers and pilers Wire cutters Diagonal cutters Components Soldering gun and solder | Practice using the various small hand tools used in TV repair. Namove and install components. | Teacher observetion |
| Determining the proper method of stripping wire. | Description. | TV chessis Various screedrivers and pillers Wire cutters Diagonal cutters Components Soldering gun and seider | Practice using the various small hand tools used in TV repair. Namove and install components. | Teacher observation |
| | | | | |

| †inued) |
|---------|
| 3 (CO) |
| ġ |
| . (|

ERIC CARLES PROMISED SERVICE

Task No. 13 (continued)

| AREA OF HLMAN REQUIREMENT | SUGGESTED TEACHING METHODS | SUGGESTED INSTRUCT:ONAL MATERIALS | SUGGESTED STUDENT ACTIVITIES | SUGGESTED EVALUATION PROCEDURES |
|---|-------------------------------|---|--|------------------------------------|
| Replacing the chassis in the cabinet using the appropriate tools. | Demonstration. Lecture. | TV set Hend tools | Practice replacing chassis in the television cabinet. | Cover on task 13 exam. |
| Soldering antenna leads in place with a soldering gun. | Demonstration. | Nutdrivers Scraedrivers Needle-nose pilers Schemetics Soldering gun Solder | Solder ing entenna. | Teacher observation. |

TASK NO. 14: MAKING FINAL OPERATIONAL CHECKS AND ADJUSTMENTS TO THE TELEVISION SET

TASK NO. 15: INSTALLING AN OUTDOOR TELEVISION ANTENNA AND TRANSMISSION LINE

| SUGGESTEC EVALUATION PROCEDURES | Teacher observation | Teacher observet lon | Teacher observation | Teacher observation | Teacher observation | Teacher ebserverien Included on final exemination of task | Teach - desruption freclude: finel examination of tesk | Teacher observation Included on final exemination of tesk |
|--------------------------------------|---|---|--|--|--|--|--|--|
| SUGGESTED STUDENT ACTIVITIES | Practice using the various small hand tools used in TV repair. Namove and install components. | Practice using wrenches. | Practice using the various small hand tools used in TV repair. Namove and install compensants. | fractics using the various small hand tools used in TV repair. Names and install compensatis. | Fractics using the various smill hand their used in TV repair. Names and install compensatio. | Practice working with the various testemers on old TV's. | Practice working with the various testemers on old TV's. | Preside warling with the warland festeners on old TV's. |
| SUGGESTED INSTRUCTIONAL MATERIALS | TV chesis Various screed-ivers and pilers Mire cutters Diagonal cutters Components Soldering gun and solder | Assortment of wrenches | TV chesis Various screedrivers and pilers Nine curtures Disponent curtures Components Seldering gem and selder | TV cheesis Various screedrivers and pilers Hire cathers Disposal cathers Components Soldering gam and solder | TV cheesis Verious acreedivers and pilors Wire certures Diagonal certures Companies Seldering gan and solder | Assertant of fectualing devices Markets Torious hand tools | Assertant of festuaing devices. | Assertant of festuaing devices Markets Torions hand theirs |
| SUGGESTED TEACHING METHODS | Demonstration. | Demonstration. | Demonstration. | Demostration. | Demotre in. | Beneatration. Latture. | Demotration. | Lathra. |
| HAMA REQUIRENENT | Selecting the proper type and size of: Screwdrivers Cutters Pilers Nutdrivers Mrenches | Necognizing the proper method of holding wrenches. | Applying methods of holding pilers for pulling, pressing, and twisting. | Macagnizing the results of using pilers for removing nurs and boits. | Applying the proper precedure for cutting with diagonal cuttors. | Recognizing the various types of thresded festeners. | Receptizing the verteus types, uses, and characteristics of tactement. | Magnishing the various types and uses of sections. |

| Î |
|----|
| |
| 13 |
| ş |
| į |

| Demonstration. Assume of teathering decises from the provides and 15 Pin. Lecture. Remains of teathering decises from the provides and 15 Pin. Lecture. Remains and main the teathering decises from the provides and 15 Pin. Lecture. Remains and main the teathering decises the teathering of the teat | A-72.A OF HARRY F-2-QUINENENT | SUGGESTED TEACHING METHODS | SAGGESTED INSTRUCTIONAL MATERIALS | STUDENT ACTIVITIES | SUGGESTED EVALUATION PROCEDURES |
|--|--|-------------------------------|--|--|---|
| Description | Applying the proper action of installing threefold footoners. | December of ten. Lecture. | Assertment of featuring devices Members Verices head tesis | Fractice serking with the various fastemers on oid TV's. | Teacher observation Included on timel empiretion of tesh |
| Description of the class could larve of the cl | Mongalising the difference between right and last hand threads. | Ommentitoriles. Lecture. | Assertant of testening devices Madern Tericon band tesis | Practice warting with the various factomers on old TV's. | Teacher elearverien Included en finsi exemination of tes |
| Description of the provided by | interpreting the manufacturer's instructions for exampling antons. | Desentration. Lecture. | • | 2 | Door on task 15 are. |
| Demostration of incident and state a | Determining the proper method of stripping wire. | Bresstrates. | A | Prestice stripping wire previous by instructor. | Teacher ebearentien. |
| Transition with the prince of | Utilizing MO-De relaises rises of commercial programme possible for commercial programme in the commercial program | 2 | | And sertion of their boing seed | Ceer on teath 15 east. |
| Communication. Let statement trin enterms and to communicate and floridations and communicate and floridation and communicate | | energy to the | | Fraction value for sections and i and feets used in TV repole. Manne and fastell empercents. | ! |
| | Solito to minera mer o so of high treation to to prodictor caids to propriete tests. | Demotratife. | 1 | Lot statuts twin entere out ultrace results on Off. | Court on 1011 15 aug. |

| ı | | |
|------|----------------------|--|
| | (3) | |
| F | RIC | |
| Full | ext Provided by ERIC | |

| MEA OF HANNE REQUIREMENT | SUGGESTED TEACHING METHODS | SUGGESTED INSTRUCTIONAL MATERIALS | SUGGESTED STUDENT ACTIVITIES | SUGGESTED EVALUATION PROCEDURES |
|--|---|--|---|---|
| Kewning the lightening errestor to provide a high resistence elscherge path for stefic charge with correct tools. Grounding the mast to prevent accumulation of stefic charge with correct tools. Rotating the enterna to the position that results in the bast picture. | Demonstration. Lecture. (service person from business may be used | TV entenne Ground wire 300 Ohm wire | Prectice and observe the installation of an antenna using the eppropriate tools. Mounting the Hightning arrestor and grounding the mast. | Cover on task 15 exem. Teacher observation |
| Applying the proper care, maintenence and storage of tools. | Damonstration. | TV chessis Various screwdrivers and pilars Wire cutters Diagonal cutters Components Soldering gun and solder | Practice using the various small hand tools user in TV repair. Remove and install components. | Teacher cuservetion |
| Determining the rosonant length of en entenne. | Demonstration using Electronic Aid Equipment or other Teaching device (1.e. Leacher Line) | E.A. modules ne set up xmliter end receiver conscher Line | Set up receiver and xmilter and exper ment with various antennaleng ns (if aveilable). Ref Jantenna section of text. | Examination - vritten |
| Attaching necessary guy wires or cab'es to stebilize the mast. | to Demonstration. | Wire with necessary tools and attechments. | Practice installing guy wires. | Techer observation |

And the second second

OCCUPATIONAL INFORMATION FOR PADIO AND TELEVISION SERVICING

| AREA OF HINNN PEQUIREMENT | SUGGESTED TEACHING METHODS | SUGGESTED INSTRUCTIONAL MATERIALS | SUGGESTED STUDENT ACTIVITIES | SUGGESTED EVALUATION PROCEDURES |
|---|---|---|--|---|
| Employment eutloak: 1. Local 2. Martional | Lecture. Use of local service person or semone from employment office. | Gevernment pamphlets and publications. Employment charts in various electronic areas (public address, radio, TV, etc.) from EIA, 2001 Street, M.M., heakington, D.C. | Need publications. Check with local employment office. Mriting for information: U.S. Department of Labor, Neshington, D.C. | Written examination. Discussion. Teacher observation. |
| lage scale: 1. Local a. union b. nan-union 2. Herional a. union b. non-union | Lecture. Union representative If one is available in local aree. Guest speaker. | Publication: "Employment and Earnings Statistics for the United States," Government Printing Office, Department of Labor, Weshington, D.C. Teacher-prepared charts. | Write National Union: 1126 16th Streat, N.M., Meshington, D.C. 20036. Read publications. Check locally. | Quiz - oral or writte Discussion. |
| Types of training available: 1. Apprentice programs. 2. Technical or trade schools. 3. On-tha-job. 4. Military. | Lecture. Guest speaker from Technical school. Union Trapresentative if evali- able, local recruiter - lecal employer may all be useful. | Publications and catalogs from various technical schools or junior colleges; military handbooks most of which are available in the school guidence department. | Meed publications and catalogs. Listen to speakers. Write for inferuation. Check with recruiter. | Written examination. Discussion. |
| Morking conditions experienced in the occupation. | Lacture. Service person Ideal here. Field trips. | Pictures. Local shop. Local servicemen. | Talk with people in the trade. | Quiz. Discussion. |
| Physical and mentel characteristics needed to qualify for employment. | Lacture. Telk by experienced servicemen. | tocal services | Listen to lecture. | Cover on expelnation. Discussion. |
| The gaographical location of employment. | Lecture. | Electranic Industries Association, 2001 Street, N.W., Meshington, D.C. | Listen to lecture. | Cover on exemination. Discussion. |
| Opportunity for advancement, | Lecture. Local employer as great speaker. | Local employer. | Listen to speaker. Check local employment opportunities. Write companies. | Ouiz. Discussion. |

OCCUPATIONAL INFORMATION UNIT FOR PADIO AND TELEVISION SERVICING (CONTINUED)

| MEA OF HAWN REQUIREMENT | SUGGESTED TEACHING METHODS | SUGGESTED INSTRUCTIONAL MATERIALS | SUCCESTED STUDENT ACTIVITIES | SUGGESTED EVALUATION PROCEDUMES |
|--|---|--|--|------------------------------------|
| Adventages and disadventages of the eccepation. | Lactura. | Publication: "Jeb Guide for Yeang Merkers," U.S. Government Printing Office, Department of Labor, Mashington, D.C. (published each year). | Read "Government Job Guide." Talk with people in the trade. | Quiz. Discussion. |
| The nature of the work involved in the occupation. | Lucture. Servicemen as guest speaker. Floid trip. | Publication: "Job Guide for Young Horhers," U.S. Generament Printing Horhers," U.S. Generament Printing Wallington, D.C. (published each year. Local servicemen. | Meed eveliable information. Listen to lecture. Attend field trip. | Quiz. Discussion. |
| The union involvement in the occupation. | Lecture. Union representative 14 aveilable in year area or teasher-directed | Publication: "Directory of National and informational United States," U.S. Government Frinting Office, Namingfor, P.C. Lecal union representative. | Write Lacel Union Office or National Handwarters: 1126 16th Street, N.W., Machington, D.C. Check locally. | |

INSTRUCTIONAL MATERIALS LIST

FOR

THE ELECTRO-MECHANICAL INSTALLATION AND REPAIR CLUSTER



AIR CONDITIONING AND REFRIGERATION SERVICING

Books

Althouse, A.D. and Turnquist. Modern Refrigeration and Air-Conditioning. Homewood, Illinois: Goodheart-Willcox Publishing Company. 1961.

Burkhardt, D.H. Residential and Commercial Air-Conditioning. New York: McGraw-Hill Publishing Company. 1959.

FIIms

"Principles of Refrigeration" 16mm, sound, b&w, 20 minutes Visual Instruction Bureau University of Texas Austin, Texas

"Mechanical Refrigeration: How it Works" 16mm, sound, b&w, 22 minutes Norwood Films 926 New Jersey Ave. N.W. Washington I, D.C. "Basic Electricity"
16mm, sound, color, 30 minutes
Order #GTG-3
Carrier Air-Conditioning Company
Syracuse, New York

"Lifting, Man's Age Old Problem"
16mm, sound, color, 13 minutes
Film Supervisor
Aetna Life & Casualty
Hartford, Connecticut O6115

<u>Filmstrips</u>

"Adding or Removing Refrigerant"
52 fr., b&w
Norwood Films
926 New Jersey Avenue, N.W.
Washington, D.C.

"Basic Principles of Refigeration"
71 fr., color, sound
Communicable Disease Center
Atlanta 22, Ga.

<u>Pamphlets</u>

"Man on the Firing Line"
(booklet on service etiquette) - \$.30 #GTG-I
Carrier Air Conditioning Company
Syracuse, N.Y. 13201



BUSINESS MACHINE SERVICING

Books

Jones, Clarence Leroy. Typewriter Mechanical Training Manual. Downers Grove, Illinois: Ames Supply Company. 1945.

Manuals

Order manuals as required from each manufacturer.

Olivette-Underwood Corporation #1 Park Avenue New York, N.Y.

Remington Rand Office Machines 1051 So. Main Street Elmira, N.Y. 14904 Royal Typewriter Company, inc. 150 New Park Avenue Hartford, Connecticut

Smith Corona Corporation Parts Department 500 E Street, S.W. Washington, D.C.



HOME APPLIANCE SERVICING

Books

- "ABC's of Hand Tools," The. Detroit, Michigan: General Motors
 Corporation. 1945.
- Brockwell, Percy T. Major Appliance Servicing. New York: McGraw-Hill Publishing Company. 1958.
- Crouse, William H. Electrical Appliance Servicing. #6729A. Scranton, Pennsylvania: International Correspondence Schools. 1965.
- Darr, Jack. How to Repair Small Appliances. Indianapolis: Howard W. Sams & Company, Inc. 1962.
- Gay, James A., Jr. Reliable Electrical Connections. #SP-5002.

 Technology Handboob published by NASA. George C. Marshail Space Flight Center: Huntsville, Alabama. 1963.
- Manly, H. P. How to Repair Electrical Appliances. (Book 2). Chicago: Frederick J. Drake & Company. 1964.
- Stephens, Arthur. <u>Simplified Electrical Appliance Servicing</u>. Chicago: Simpson Electric Company. 1966.
- Tricomi, Ernest. How to Repair Major Appliances. Indianapolis: Howard W. Sams & Company, Inc. 1966.

Films

"Basic Electricity - The Electron Theory"
16mm, sound, 5 minutes
Encyclopedia Britannica Films
65 E. South Water St.
Chicago I, III.

"Elements of Electric Circuits"
16mm, sound, b&w, Il minutes
Encyclopedia Britannica Films
65 E. South Water Street
Chicago I, ill.

"Electromagnets"
16mm, sound, b&w, 10 minutes
McGraw-Hill Book Company, Inc.
330 West 42nd St.,
New York, N.Y. 10036

"Electrons"
16mm, sound, b&w, 10 minutes
Encyclopedia Britannica Films
65 E. South Water Street
Chicago I, III.



"Home Electrical Appliances"
16mm, sound, b&w, 11 minutes
Encyclopedia Britannica Films
65 E. South Water Street
Chicago 1, 111.

"Introduction to Electricity" 16mm, sound, b&w. Coronet Films Willmette, III.

"Magnetism"
i6mm, sound b&w, 16 minutes
Encyclopedia Britannica Films
65 E. South Water Street
Chicago I, III.

"Measurement of Electricity" 16mm, sound, b&w Coronet Films Willmette, III. "Nature of Heat"
16mm, sound, b&w, 10 minutes
Coronet Films
Willmette, 111.

"Modernizing Motors"
16mm, sound, color, 19 minutes
Dow Corning Corporation
8555 16th St.,
Silver Spring, Md.

"Lifting, Man's Age Old Problem"
16mm, color, sound, 13 minutes
Film Supervisor, Information and
Education Department
Aetna Life & Casulty
Hartford, Conn. 06115

Filmstrips

"Understanding Electricity"
(7 filmstrips - color), series #1210
The Jam Handy Organization
2821 E. Grand Boulevard
Detroit, Mich. 48211



RADIO AND TELEVISION

Books

ABC's of Servicing, The. #4-4. Washington, D.C.: National Radio Institute. 1965.

Dictionary of Electronic Terms. #IX-4. Washington, D.C.: National Radio Institute. 1967.

Herrington, Donald E. How to Read Schematic Diagrams. #RSD-1. Indianapolis: Howard W. Sams & Company. 1962.

Levy, Alex, and Murray Frankel. <u>Television Servicing</u>. New York: McGraw-Hill Publishing Company. 1959.

Marcus, William, and Alex Levy. <u>Practical Radio Servicing</u>. New York: McGraw-Hill Publishing Company. 1956.

Films

"The Printed Circuit Story"
16mm., sound, color, 25 minutes
Bray Studios, Inc.
729 Seventh Avenue
New York 19, N.Y.

"Volt Ohmmeter Operation"
16mm,, sound, b&w, 15 minutes
Norwood Films
926 New Jersey Avenue, N.W.
Washington, D.C.

"Ohm's Law"
!6mm., sound, baw, i9 minutes
U.S. Army
TFII-1200
Cat. No. OE-34006

"Safety Precautions for the Electronics Personnel" 16mm., sound, b&w, 18 minutes U.S. Navy MN 6754 0E-34006

"Tube Tester Operation"
16mm., sound, b&w, 9 minutes
U.S. Navy
MN-1540-P
Cat. No. OE-34006

"Signal Generator Operation" 16mm., sound, b&w U.S. Navy MN-1540-9 Cat. No. OE-34006

"The Electron Theory"
16mm., sound, baw
U.S. Navy
MN-8016-a
Cat. No. OE-34006



Filmstrips

"Radio Servicing Series" (6 strips), b&w McGraw-Hill Textfilms 330 W. 42nd Street New York 36, N.Y.

<u>Charts</u>

"Block Diagram of Radio Receiver" (34 \times 22)
Howard W. Sams and Company Indianapolis, Indiana

"Block Diagram of T.V. Receiver" (34 x 22)
Howard W. Sams and Company
Indianapolis, Indiana

